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PRESIDENT'S PAGE

by Lloyd E. McIntyre

The 20th Anniversary Convention Celebration is now part of history, and what a historical occasion it turned out to be. The selection of programs, speakers, and tours will surely make this the event of the year.

So much behind the scenes effort was made by John Haught and the Pittsburgh Antique Radio Society (PARS) members. The Mid-Atlantic Antique Radio Club, with Joe Koester leading their Radio Restoration Program. Other program presenters included Mel Comer; John Weyer on the subject of test equipment collecting and the history of Weston. We were most honored to have the founding father of the Antique Wireless Association (AWA) speak on *Amateur Radio—The Way It Was*, Bruce Kelley. Then it's always a treat to have Ralph Williams present the restoration of the Atwater Kent Museum, which is also a part of his home in Orient, New York. Ed Lyon's presentation of other manufacturers of radio in Pittsburgh; also his very capable handling of the auction, along with his wife, Millie. This was one of the best run and largest auctions in ARCA history. (A report is elsewhere in this GAZETTE.)

A new program added this year was the Ladies Collector Corner. It turned out to be such a great success that it will be expanded next year. (A further report is in this issue).

The Trader's Market; the Awards

Banquet, with guest speaker James Conrad (grandson of Frank Conrad, the great inventor and father of commercial radio broadcasting); the Old Equipment Contest display, which was excellent.

A special thanks to the over 25 people who took care of the registration desk and Museum bookstore, without whose help the show would not have went on.

I am sure I have missed something. A convention, of this size produces so much in such a short period of time that documentation is somewhat difficult. Over the next couple of issues we will try to bring to life in *LIVING COLOR* some of the events and grandeur of the equipment that was displayed. Even with our exclusive *COLOR* pictures, nothing will replace being there in person.

I am pleased to report to you that through the efforts of the West Virginia Chapter, the 1993 convention of ARCA will be at the Museum of Radio & Technology in Huntington, W.Va. Make plans now to reserve that week in June so you never miss another ARCA convention.

I want to thank the Peoples Natural Gas Company for their corporate sponsorship. This was the first time in ARCA history that a company donated a very large sum of money to help sponsor this event. And, to Continental Airlines for providing air transportation under contract. This also was a first, and may have been the first time a radio club has provided this. ARCA, in so many ways, has been the leader in programs and the growth of this

industry. We want to remain at the forefront—ask your collecting friends to join us in this effort.

Our new contributing cartoonist and artist, Ron Boucher, has changed the way your magazine looks and has added a touch of humor. We are grateful for his personal touch.

We would like to welcome Joe Koester to the Board of Directors. Joe is currently President of MAARC and I look forward to his advice, as a new Board member.

All the issues this year will be a continuation of the 20th Anniversary Celebration of ARCA. As it has been said, "KDKA—it all began here," so we want it to be said, "ARCA—the beginning of all great things that gave radio collecting such a wonderful and historical significance."

We have truly been blessed with great material to provide you, the member, with a grand GAZETTE. Please do not forget these people who have taken their time, along with diligent research to bring you these articles. Drop them a little thank you note, it means a lot. Then sit down and contribute a letter, story or personal experience that we may add to the GAZETTE.

I am Looking forward to seeing many of you this fall at the MAARC picnic or the AWA convention. Don't forget ARCI in Elgin and the many other events still left in '92. Good collecting this summer and let's get back together again this fall to talk about our #1 subject—*RADIO*. ■

(See pages 34 & 35 for pictures.)

LOOKING BACK

by Chester Wisner

Radio and electronics certainly is a great field for hobbyists. There are so many different facets that interest different people. There is amateur radio operating, (yes, I am one of them), some like to build radio receivers and electronic gadgets, etc. Some like to listen to DX stations on the various short wave bands, and some like to log distant stations on the broadcast band.

Early in my life I got interested in that segment of the hobby. I used to stay up late some evenings to try and snag stations from the deep South and from the West Coast. Sometimes when special DX programs were scheduled by various radio clubs I'd go to bed early (7 p.m. or 8 p.m.), then

get up at 1 a.m. or 2 a.m. and listen to stations along the Mexican border. Remember SENT, XELO and Dr. John R. Brinkley advertising his hospital in Little Rock, Ark.? The story was that he was put off the air on U.S. stations due to bad advertising. He said he was determined to advertise, even if he had to go to Mexico to do it.

It was quite a thrill the first time I heard Mexican stations along the Rio Grande. I would also hear a California station now and then. KFI in Los Angeles was one. I could picture nice, warm sunny beaches with crowds swimming, surfing, etc., while it was below zero on a cold New England night. I didn't realize how cold the Pacific Ocean water can be. I found out many years later that it's about the same as Cape Cod water—*burr*.

Of course, installing new antennas was part of the hobby too.

(Continued on Page 4)

ARCA-PARS '92 AUCTION RESULTS



by Lloyd E. McIntyre

In the past, we have listed all the different makes and models of items sold and their prices. Then, someone would say, "So what? An AK model 20 big box sold for \$xxx." And, you asked, "Did it have tubes? Were they good? Was the battery cord and instruction manual there? Did the cabinet have a chunk missing? Was it painted red, black or blue?", etc. The price was based on a visual observation by the bidder at the auction, something you the reader have no access to.

Auction prices, therefore, have little or no meaning after the fact. Nor do they necessarily relate to true value. There was more than a dozen examples brought to my attention by sellers of items offered in the Trader's Market for much less than what they went for in the auction. A word here to the wise. First, *Sellers*, put your equipment in the auction and not in the Trader's Market. *Buyers*, buy it in the Trader's Market before you go into the auction. Now surely this is not a conflict of advice is it?

Anyway, everyone enjoys the auction and it is a relaxing kind of competitiveness that gives one the satisfaction of having beaten his buddy or neighbor out of something that he may not have been quite willing to pay that extra two or three dollars for. It surely doesn't set value. I recall a few years ago seeing Edison battery oil bottles sell for \$100 each. I bid for three and got the lot this year for \$21. So it goes to show that things

are still only worth what a buyer is willing to pay. A Garod model 6AV-1 Catalin with a minimum sell of \$945 only made it to \$450, and was a no sell. Our auctioneer Debbie Pack and her mother, who are professional auctioneers and antique dealers, have noted the peaking and apparent slip of prices in this market. Part may be the economy; the other, over pricing.

One hundred fifty-five lots of equipment went under the auctioneers gavel. This was the largest number in physical bulk and commanded the highest total of any auction of ARCA in recent memory. Thanks to Millie and Ed Lyon, buyers and sellers were all settled within an hour of the end of the auction. ARCA uses the Missouri Auction School forms and retains professional auctioneers and spotters to make sure the membership has a carefree and entertaining time.

Thank all of you who attended and supported the auction. For those of you who could not make it, you missed another great show. ■

LOOKING BACK

Continued from page 3

Long wires, doublets, verticals, big oversized loops, etc. I also tried counter-poise versus ground connections. When I would hear the Ham ops chatting back and forth, I thought that must be a wonderful hobby. I was about 12 years old when I first heard of Ham radio. I

wrote to the Federal Radio Commission in Washington, for information on becoming an Amateur. In due time, I received an 8½ x 11 envelope about 1½ thick with all the info—uhg. I tried reading through it and shortly came to the conclusion that there must only be about 100 or 200 people in the whole country smart enough to get into that field.

Later, on I heard about an Amateur Radio Club in a nearby city. I was able to get to a few meetings, and was astounded when the president of the club introduced me to a couple of teenage members, and gave their call letters along with their first names.

After a few sessions at the club, and a few code lessons, I started to catch onto the dots and dashes. Later, I scrimped and saved and finally managed to get a very inexpensive Ham receiver. I wasn't too diligent about the code, but now and then I would tune in to the 40 or 80 meter band and felt quite a sense of pride when I could find a good slow signal, and pick out enough letters to catch the op's name, and maybe even the name of his city and state. I didn't do too much about trying to get my license though. Lots of thought but not much real action in that direction.

Time passed on and soon I was 20. In 1941, we entered World War II and in September 1942 I joined the Navy. I guess I was just plain lucky, and the good Lord must have intervened. I put in for radio school and was accepted. I was sent to RCA Radio School in New York. I lived at Pier 92, and went to school in what must have been a section of a warehouse that had offices. I received code, theory, message handling and routing, typing, and a class now and then on Navy regulations, etc. My early code practice paid off, as I was able to copy code at 28 words per

minute (WPM) with a pencil, and could get fairly good copy at up to 35 WPM with the typewriter at graduation.

When we graduated, some of us were offered a chance to go to Aviation Radio School in Memphis (Millington) Tenn. There we got *Hands On*, the best and latest radio transmitters and receivers. I got to be an instructor there and taught basic theory for about six or seven months. About that time some, of the fellows that had been out in action in the Pacific were coming back to the states for shore duty, and all us *Green Horn* were replaced by *Old Salts*.

After gunnery school at Yellow Water (Jacksonville), Fla., we were assigned to squadrons. Myself and a couple of friends were sent up to Patuxent River, Md., Naval Air Station. We ended up in a Transport squadron. We used big, 2- and 4-engine flying boats especially modified for cargo hauling. PBM Martin Mariners and PB2Y Coronados by Consolidated. They had a cargo route that stretched from Maryland to Bermuda, Puerto Rico, Trinidad, Br. Guiana, and two stops in Brazil. One at Belem, on the mouth of the Amazon River, and our last stop was at Natal. Right on the easternmost projection of the South American continent. It used to take us nine or ten days to make the whole route.

At first, we had a set of RAX receivers and a big GO-9 transmitter. Later, plans were outfitted with BC-348 receivers and Collins ART-13 transmitters. They had voice transmissions for up to 25-30 miles, but used CW (Code) for position reports, weather messages, etc. Our job was to haul high-priority cargo and personnel. At times, we would get a sting of duty in the radio shack at squadron base, and assigned to work in the radio shop on

repair and maintenance—lots of good training.

I was released from the Navy in September 1945. I had three years and two weeks of duty with the Navy. I was, of course, glad to get back to civilian life. I got a job with a local radio service shop. I enjoyed it. I met a young fellow who ran his own radio shop and in the back of my mind I'd recall the magazine ads in the electronics magazines, about how you could get rich running your own shop. I bought a half interest in the young fellow's shop and figured that things could only go up from there—*wrong*.

Actually, things were pretty good for awhile. There had been no civilian radios built since 1941, so at first there were lots of repair work. But, eventually a few new radios began to trickle into the market. Fine, but try getting some when you are a small independent operator. We bugged the distributors in the area, but of course, they could deal with the bigger dealers and chain stores. Eventually, we did start getting a few new sets in. I recall the morning when our first shipment of six sets arrived. We opened the boxes, checked them out, and started to put them in one of our show windows. *Wow*—they all sold before noon. I remember they were fairly good *All American Fivers*, made by Howard Radio Co. of Chicago. It must have been a fluke in the delivery network, because we couldn't get another radio to sell for six months. About that time, my partner became sick, and decided to take a part-time job at a local radio station. I bought the remaining half of the business from him at that time.

Now the plot thickens. It was still very hard to get any sets to sell, but service work was pretty steady. That

is until the Easter season came up. Boy, talk about slow business—*ugh*. The cash register grew a bumper crop of cobwebs. With Spring's arrival people started to bring in their portable sets for repair and batteries. Also, the servicing of auto radios had a bit of an increase. The auto radios were a bit of a pain, as you had to remove and then reinstall them. One quirk was, people didn't mind a reasonable repair bill on their auto radio, but boy, some of them sure did hate to pay more than a buck and a half for a home radio repair.

Let me tell you about a couple of situations. I was out on service calls and my XYL (wife) was tending the store. A fellow brought in a small table radio for repair. Seems the dial didn't work. Simple job, 1' of dial cord, and a half hour of labor. Dial cord, 15¢; labor, \$1.50; total bill, \$1.65. A couple of days later the man came in for his radio. My wife handed it over the counter to him and said, "Your radio is all set for you, and the bill is \$1.65." *Wow*—the guy became irate. He called us crooks, robbers; accused us of trying to get rich on a trifling repair job. In fact, he left the set on the counter and went outside and came back with his wife. She went through the same tirade, with basically the same accusations, and added a few more. Finally, they paid the bill and left slamming the front door as they went. I can look back at that now and laugh. It wasn't funny though then. Get rich repairing radios—*Ha!*

One fellow brought in a GE portable set. The one that had the 2-volt rechargeable wet cell battery. A tough set to work on. You have to field strip it, then hook the set, antenna, battery and charger together with clip leads to check it out. The bill on that job came to about \$8.50. At least this

fellow didn't get nasty about it, but, he politely asked for an itemized bill. As I handed it to him he said, "Thank you, now I've got you on some price gouging. You will hear from the O.P.A." (Remember the Office of Price Administration?)

Well, a couple of days later a man came in with a small table radio. He asked if we could just give it a general checkout. "Fix whatever it needs," he said. I asked him what problem he was having with it. "None," he said, "just give it a check-out. Funny thing, it worked perfectly, all tubes tested very good and the set played on the bench just fine. I sort of got the feeling that he was checking up on the complaint lodged by the guy with the GE portable. I charged him 50¢ for testing the tubes and bench check.

Now the other side of the coin. A Mr. Benson came in with a nice RCA Tombstone-type set. Had a home-made loop antenna mounted on a masonite back panel. He explained that he was trying to make it work with an internal antenna and that he had adjusted all the trimmers that he could get at. Needless to state, the set needed a complete alignment job. Broadcast band and three shortwave bands. When it was done he paid for it quite willingly. A couple of days later, I saw him drive up in front of the shop and he was bringing the radio back in. I sort of figured he wasn't satisfied with the alignment job. Not so. He had taken it home, and tried again to adjust the trimmers to make his homemade loop work as good as an outside antenna. I charged the same \$7.50 again and he didn't complain. He said it was a real fine radio, and that he was going to leave it alone from then on.

An elderly lady that lived a couple of blocks from our store brought in

an AC/DC table set. She said the volume control was either too soft or would blast out loudly. I replaced the volume control. Volume control \$1.25; labor \$2.00; total bill, \$3.25. She called a couple of days later to see if her set was ready to pick up. I told her it was. She didn't ask the price, but said she would send her grandson down to pick it up. In a few minutes a nice young boy came in for it. I set it on the counter for him and told him the price. He pulled out a \$1 and said that was all his grandmother gave him and it should be enough. I told him it was \$3.25, and to go and advise his grandmother of that fact. Boy—about ten minutes later the boy's mother and grandmother came in. The boy's mother was nice and polite, but the grandmother! In no way, shape or manner did she ever hear of such highway robbery—\$3.25 to fix a \$12.95 radio. Indeed! Robber, crook, thief, scoundrel, etc. She finally told me to put it back as it was, and she would take it to a shop where she would get a fair deal. The daughter suggested that maybe she ought to pay for it and take it home and try it to see if it wasn't satisfactory. She would have none of that. So, I removed the new volume control, taped the knob to the cabinet and gave her back the set. Wow—then it even got worse. In addition to all the other things, I had deliberately mutilated her perfectly good radio. Finally, her daughter managed to get her to take the set and leave. This she did amid threats of having her lawyer take me to court. Fortunately, I never heard from her again.

Since it was difficult for us to get any new radios to sell I contacted the managers of some retail chain stores that were getting some sets to sell. I made a deal with them to repair defective sets that they sold. It wasn't

very profitable, as they wanted them fixed for half the price of regular customers. Not only that, but they would not allow me to use any of my own parts for repairs. I had to tell them what I needed and they would get it from their headquarters in Chicago, Pittsburgh, or wherever. That made a great game, as you would have to pull the chassis, troubleshoot it, then wait one, two or three weeks for the parts to come so you could finish the job. One Admiral console set had a Filter cap with one section of the three shorted. I ordered the replacement cap. A couple of weeks later the manager gave me a single 20 mfd. cap, and said, "Just replace the one defective section." I chose not to do anymore repair jobs for that store.

One day, one of the directors of the City Department of Parks came in. He asked if I could supply three amplifiers, three record changers, and six large outdoor speakers for the City's three ice skating rinks. I couldn't believe my good fortune when I gave

him a price and he said, "Go ahead and get them and install them." Now and then the sun shines through the grey skies! When the City check arrived I took my wife out for a steak supper.

After being established three or four years, we began to get a flow of, more or less, steady customers. Auto radio sales and installations helped. Now and then a musician would bring in a guitar amp, or an amp from a night club. Those jobs usually paid fairly well. We even did a few intercom sets for a couple of doctors and restaurants. One fur shop had me install an intercom system from their office to their cold storage fur coat vault.

In June 1950, the Korean *Police Action* started. In September, I got notice to report back to the Navy for active duty. I closed up the radio shop, and November 1, went on active duty. I was released and returned home July 1, 1952. I did not reopen the radio shop. ■

MEL'S CORNER



People ask me, "How did you get into Wireless Radio?" The answer: the Boy Scouts of America in 1919, while living in Racine, Wisconsin, at that time. There had been a two-week summer camping tour schedule. On arrival, our Scout Master designated me to extend a long wire from a treetop over to the master tent pole and down to a table, where an array of various wireless equipment sat.

There were about 25 scouts in our group. None of us had an idea of what this was all about, or what

would happen. We were all amazed at the various wires being hooked up to all these parts laid out on the table. The Master was quiet, saying nothing, but keeping busy.

Finally, he put on a pair of *cup* sover his ears (phones) and started feeling around with a fine wire—on a shiny piece of stone. At the same time he kept pushing a button operating a buzzer.

Nothing happened. Next, he reached over and pulled on a switch, and with a tap, hit another round knob—*wham*, out jumped a bright blue flame.

(Continued on Page 10)

BRING FILTER CONDENSERS BACK TO LIFE

by Carl Creque, Culebra, PR

The most likely source of difficulty in restoring an old radio that has not been operated in years is its filter condenser, almost always an electrolytic capacitor. About 80 percent of the time, when trouble is encountered, it lies not in the tubes, but in these large power supply filter capacitors. By the way, just about the worst abuse you can inflict on a piece of equipment is to go ahead and plug it into *check it out*. Failure of one or more of the power supply filter capacitors is almost guaranteed.

I will now present a method of bringing most old radios back to life safely, provided they were in operating condition when originally stored.

First, a word or two about electrolytic capacitors. Unlike their wax paper or mica-insulated cousins, filter condensers have no discrete insulation. Rather, their dielectric consists of an oxide layer that is *formed* on the positive electrode by the process of electrolysis—hence the name electrolytic capacitor. This insulating layer becomes very thin in the prolonged absence of voltage stress and is almost certain to be punctured when normal operating voltages are suddenly applied after a long storage period.

The technique I have developed consists basically of bringing up the voltage in small increments over a period of weeks, rather than applying it all at once.

Common sense leads to the conclu-

sion that if you limit the voltage to a small value and increase it gradually, the electrolytic condensers' insulation will gradually be *reformed* over a period of several weeks, giving them a fighting chance. When you DO apply full operating voltage to your radio, the filter caps should work normally instead of shorting out.

How do you limit the line voltage to your radio? Simply plug the subject radio into a variable autotransformer (commonly called a variac) whose output is set to 10-15 volts AC line voltage. Turn the radio switch to ON and verify that there is 10-15 VAC across the primary winding of the radio's power transformer. **THE RADIO IS TO BE LEFT "ON" CONTINUOUSLY** for several weeks; perhaps even a month or two, depending on your patience and how many years the radio has been out of service.

Allow about a week to pass with the variac set to 10-15 volts before raising the voltage to 25 VAC, the next stage in the process. Once again, allow the radio to run for about a week at the new voltage setting. Keep raising the line voltage input to the radio a small increment each four to seven days. If the radio is equipped with glass tubes, they may begin to glow dimly. If you connect a voltmeter across the terminals of the filter capacitors, you should see a steady DC voltage that increases with each stage of the process. You should reach full line voltage four to eight weeks after initially energizing the radio.

Radios that have not been turned on for 40 years or more will likely require at least three months of this gradual voltage-raising technique to

bring them back to life. Furthermore, once your radio is operating normally again, I highly recommend daily use to keep it in working order. The longest you should allow it to remain off is seven days.

The beauty of this procedure is that

it works, and you don't have to be an expert technician to apply it.

Here's hoping I have contributed a Restoration Hint that is useful to all old radio enthusiasts, regardless of the technical expertise they may possess. ■

MEL'S CORNER

Continued from page 8

"Okay fellows, have your notebooks ready, you are about to learn the Morse Code signals. To receive a badge-patch you will have to memorize the meanings of these dots and dashes—all by next week. Here is letter 'A'—short flash—long flash—buzz-buzz-buzz." And, away he went on down the line, slow at first, but gradually increasing speed.

The scout troop had acquired a dozen or so key and buzzer boards for code learners from the old Klitzen Radio Company of Racine, Wisconsin.

The next day, the *pup* tents sounded like a swarm of bees had invaded them. You could hear one buzz out S-A-M, the next would answer M-I-K-E, and so it went. A few days later the messages were flying back and forth, gaining speed.

Then came the evening when we were all called into the Master tent where, on the table, three sets of earphones had been connected. But, what was this big blue flame rig setting on the table? We each took our turn putting on the phones. The Master threw a big switch and the blue flames started spitting out the dots and the dashes. We immediately recognized the slow code words, "Are you there?" This repeated several times.

Then, the big switch was thrown over and into the earphones came this code buzz, "You bet, you bet." All this was coming from the Klitzen plant, almost 15 miles away. Talk about excitement—here we were buzzing back and forth over all that distance.

Right then and there, the *Wireless Bug* had hit each and every one of us—with both feet. How do we go about doing all this when we get home?"

The big question then was, "How and where do we make one of these sets—what do we need?"

Fortunately, our Scout Master (Perry Thomas) was employed by the old Klitzen Radio Company. Arrangements were then made for meetings after work there. With the surroundings at the plant—big loose couplers, rotary spark gaps, and the smell of bakelite panels being sawed, and sets being assembled—enthusiasm was at its height. The test and operating room with receivers and big spark transmitter were a sight to see, hear and smell the ozone. Big four wire, flattop antenna and insulators were setting on the rooftop.

I recall Perry starting the boys out making up their crystal receivers. Double slide tuners were the order of the day at first. Crude as they were, coils were wound on cardboard tubes with sliders. A chunk of galena and a detector was made, tinfoil and mica formed a fixed condenser. Then a \$5 pair of Murdock phones became

necessary.

Money in the teens was a mighty scarce item to come by with families passing down what little they could afford to their sons. The fortunate ones whose dads became interested in what those crazy kids were doing did their best to help out.

Later, somehow, a catalog arrived in the mail from the old Electro Importing Company of New York. In there were all kinds of wireless goodies, sets and parts, even wiring diagrams with the explanations of how they worked and were put together, page after page. Prices resembled mountains then—but peanuts now.

Along with this catalog came an application to belong to a National Radio Club—*The Radio League of America*, which I promptly joined. I still have the lapel emblem. A question on this application, "Do you volunteer service as a radio operator on ships in wartime?" I agreed (at age 12), but then World War I was over (made it later in the Navy, before World War II).

So, where were all these fellows trying to build up a crystal set-receiver? Out mowing lawns wherever they could, painting, digging gardens, running errands—anything to gather a nickel, dimes, maybe a quarter, or so. Naturally, I was a hanger-on fixture at Klitzen Radio, hauling out trash, cleaning the floors, every spare moment from grade school time—I was there.

Many of the trash bits and pieces of wire scrap, bakelite and the like usually got hauled home in my little express wagon—the wire jointed together became my aerial.

I recall buying my first pair of Murdock phones with nickels, dimes, and some quarters, saved in an old cigar box. That was the day I first wired in

the phones and heard those glorious sounds of static from an approaching thunder storm.

We were only a block away from Lake Michigan at that time. Soon it was possible to hear all those steamers plying their trips on the lake, with those big spark transmitters pounding away.

The rest of our gang had their crystal sets working and all we were doing was *listening in* to those signals. We all wanted a transmitter in the worst way, but getting a real transmitter and the necessary license was far beyond our limited funds. That's when a few of our more influential friends parted company as we could hear them roaring away with rotary spark gaps.

A neighbor of mine owned a Model-T Ford Roadster. He was always cleaning the vibrators on those Ford spark coils. *Sparks*—he had an extra one he would give me. That started it. I called in a couple of my buddies, hooked this coil to my antenna and just a few blocks away, here she came buzzing in. The tone was very raspy at first, but by padding up the vibrator, out came a high-pitched note.

Four of us in the immediate surrounding area were having a ball making improvements all the time with condensers and a helix—then came the bombshell.

A call came from our Scout Master, "What the devil are you guys doing? You know you have to have a license to get on the air. Each of you, get off right now." That did it, we were back to listening in.

Time wore on, some of our fellows became more prosperous building spark transmitters with rotary spark gaps, the sounds of which will hardly ever appear again. The sign off was

most impressive as the spark rotor slowed and the tone faded away—to 73s.

The sounds of the *Birdies* were ones few recall these days. These were the high-powered ARC signals coming from the Eiffel Tower in Paris, France, called "FL", a bird-like note of high pitch, almost musical to hear, at high speed code.

Old standby, usually easy to reach,

was NAA Navy Arlington, Va., time signals with our loose couplers on 2,500 meters—*lotsa power*.

The early gear is still around, but not plentiful. Let's not forget how this Wireless Radio all got started, coming to the marvelous equipment we have today.

Did the Boy Scouts inspire this article?

The answer: —.— — ■

RADIO: AS I EXPERIENCED IT

by Bill Hoy

CHAPTER 13

THE RIDER CHANALYST AND VOLTOHMYST

Test instruments have always been essential service aids for troubleshooting electronic equipment. Around 1938, John Rider, of Rider Manual fame, invented two new, important test instruments, the Chanalyst and Voltohmyst. First, I will describe the Chanalyst.

When I first saw the Chanalyst, I realized its timesaving potential and purchased one for my shop. It was Serial Number 1594, of the Chanalyst production. And, I have it today, still in good working order.

The Chanalyst was a 12-tube device, four being 6E5 *Magic Eyes*. It contained five separate circuits called channels, they were:

1. A complete 95-1,700 Kilohertz tuned RF receiver-channel, with four tubes and a Magic Eye indicator.
2. An audio amplifier-channel, with one tube and a Magic Eye indicator.
3. A 600-15,000 Kilohertz, oscillator-signal amplifier-channel, with two

tubes and a magic eye indicator.

4. A power consumption (Watts) indicator-channel, with the fourth Magic Eye indicator.

5. To top all this off, it had a built-in 0.0-500 DC volts electronic voltmeter, using one tube.

All five channels of the Chanalyst had completely separate inputs and outputs to phone jacks, they shared only the power supply. Each instrument was supplied with input test leads for all tests. The built-in voltmeter could be plugged into *phone-tip jacks* on each channel, to measure the voltage any Magic Eye was indicating.

To use the Chanalyst, the correct probe was placed near, or on first stage of a radio, if that stage was okay, a signal would be indicated by the Magic Eye, the probe was placed on succeeding stages until one was found without the signal, or a low signal, that stage was the source of the trouble. You searched that stage for the exact problem.

The Rider Chanalyst was as versatile a test set for AM radio and audio work as I have ever seen. There was no test you could imagine, for which it was not useful. The only omission I could see, was an AC voltmeter, and provi-

sion for measurement of resistance, those demands were met by the second Rider creation, the Voltohmyst.

Probably, most of our readers have seen the RCA Voltohmyst, it has been an almost essential unit for every technician's workbench since 1940. Chances are, that if today's shop is not using digital meters, it has a Voltohmyst. They were very rugged, and as accurate as needed in shop work. As you have guessed, the RCA Voltohmyst was the former Rider instrument. RCA was said to have paid John Rider \$1million for his rights to both instruments. The Voltohmyst had six ranges of scales for AC and 7 DC volts from 0.0-1,000 volts, for Ohms to about 1,000 Megohms, or so. It could make voltage measurements without affecting the operation of the circuit being measured. These two instruments made it much simpler to find *intermittents* in radios. Do you know what intermittents are?

They are those gremlins that cause a piece of electronic equipment, or radio, to go completely dead and drive you up the wall, because as soon as you touch a tool anywhere in the set, it resumes normal operation again. With the Chanalyst, you connected to several possible sources of the problem, adjusted the controls on the Chanalyst for normal readings, and just did something else, while you waited for the trouble to reappear. It was so very simple.

My Chanalyst is still perfect, with only the replacement of a .001 Mfd. coupling capacitor, and the two electrolytic filter-capacitors after the unit had given 42 years service. I continued to use my Voltohmyst until the 1960s, when the meter moving-coil opened up and a new, or used meter movement could not be found.

While I operated a television, radio,

and appliance repair shop, in Charleston, W.Va., during the mid-50's, I had the Chanalyst, cleaned and polished, and operating on one of my bench shelves. The Chanalyst had a very impressive appearance, as did the two, 5' scopes sitting beside it. When a customer saw the bank of green lights and asked about either, I would explain the superb ability of the Chanalyst and Voltohmyst and assure him, or her, nobody else in town had the Chanalyst. I believe I kept many of my customers because of the bench instruments, which included a KAY MEGA-SWEEP sweep generator, RCA WR-67A test oscillator, RCA 76A AC vacuum tube voltmeter, RCA tube analyzer, RCA WO-77 oscilloscope, and my schematic file filling two, four-drawer file cabinets. Our good service and low prices didn't hurt, either. When I decided to go to other work, I was offered an almost-new 1956 Ford Country Squire station wagon to just leave the equipment for the new operator, an offer I refused. I kept some of the equipment and sold the remainder to various other shops in the area.

As I was completing this article, I read an advertisement in our ARCA Gazette, asking for a Crosley WLW 37-tube console radio. I believe the advertiser was referring to the Crosley WLW Special receiver introduced in the late 30s, as something of a publicity-gimmick. During this same period, Crosley had been operating WLW Cincinnati, Ohio, with a power of 500 Kilowatts to the antenna. WLW used Class "B" modulation of the final RF amplifier, this was many times the power ever used before.

(Continued on Page 16)

THE OZARKA DELUXE RADIO LOUD SPEAKER

The Ozarka Deluxe a speaker Radio was made by the Ozarka Company, Inc., of 122 Austin Ave., Chicago, Illinois. This particular speaker was featured on the reverse cover of Popular Mechanics in February, 1928 (pictured below right).

The drum speaker is approximately half the size of a 50-gallon drum. It is metal with a plaster horn inside. It has a very ornate wooden grill and sits on a four foot very ornate brass stand.

My speaker was reborn from a chicken coupe in Rhode Island. When found it didn't appear there was any life left to it. The speaker itself was all rusty with a completely broken grill and of course the grill cloth was all holes. The stand was just a mass of rust.

My first step was to test the driver to insure it was good. After determining that, it was onto the next step, which was the cord. The cord was very worn and frayed, and the tips were missing. I found a new (old stock) cord in my parts box that was extra long and would allow me to connect the speaker to the radio anywhere in the room.

The next step was to place the pieces of the grill together in order to trace a pattern for the new grill. After the grill was cut, sanded and painted the original color, the escutcheon was replaced in the center.

The entire metal drum was sanded, brushed and finally sanded smooth. The trim was sanded, then painted black and lacquered. The painting of the drum itself was difficult because

originally it had a wood-grain finish, the metal itself being made to look like wood. After several attempts, using rags, paper and aluminum foil, the final coat was placed on with a brush.

A new reproduction grill cloth (as close to the original as could be found) was placed in the speaker and the entire speaker was reassembled.

The speaker stand was sandblasted, and all parts and assembly screws were rebrassed. The four legs were sanded smooth, painted, lacquered and reassembled. Many coats of lacquer were used on the legs.

The finished product was indeed a *thing of beauty*. ■

IF YOU wish to improve any radio, use an Ozarka Loud Speaker—the speaker with the exponential air column—the non-vibrating speaker.

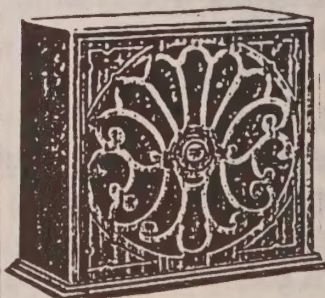
OZARKA DE LUXE LOUD SPEAKER

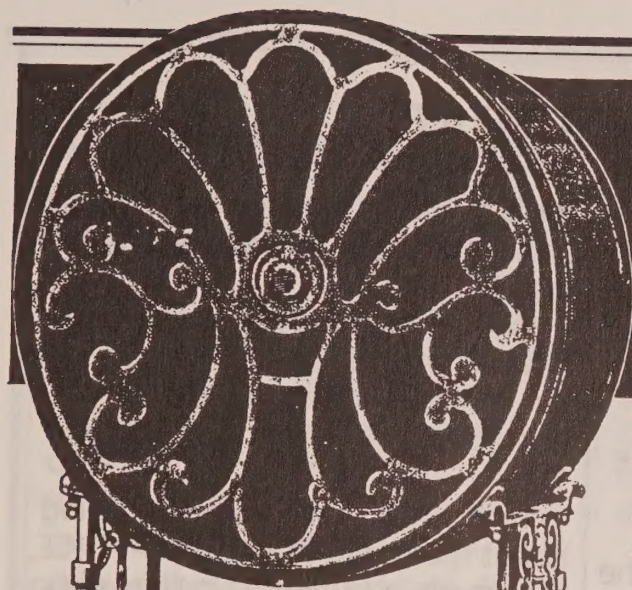
THE LOUD SPEAKER with an air column 75 inches long. Mounted on a wrought iron base—volume, tone and beauty in one.



OZARKA No. 60 LOUD SPEAKER

A FIVE-FOOT air column speaker enclosed in a walnut finish cabinet. An ideal speaker for use with the Ozarka Corona.





In all the World

THERE IS NO LOUD
SPEAKER LIKE THIS

6 FT. 6 IN. OF HORN

Make \$50 a Week In Your Spare Time

NO selling experience necessary; no canvassing. No hunting for prospects—every radio owner a prospect. Demonstrate in the home—evenings—your spare time. A brand new up-to-date tried and tested improvement in a loud speaker which added to any radio means a sure sale—the less talking you do the better—a new model Ozarka Loud Speaker will sell itself to any radio owner.

Revolutionizes radio reception as you now know it. Produces the true tone of any radio—the results are amazing. Test alongside of any ordinary loud speaker and let the results talk for themselves. Easy sales—big profits—exclusive territory to proven men.

Sell Radio Loud Speakers

Entirely new principle—6 foot 6 inch horn. No vibration—registers every note perfectly, even the lowest bass. The only loud speaker which reproduces tone accurately. Makes an entirely different and true sounding instrument out of any radio. If you are looking for some extra money here is a sure way to get it—quick and easy. Every sale made means a booster to make more sales. 4810 men are now in the Ozarka organization. There is still some open territory for men who can prove their ability. You'll not only sell them easily yourself but have salesmen working for you.

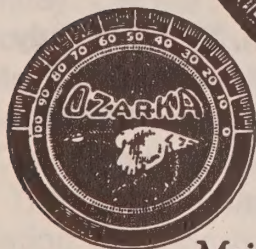
30 Days' FREE Trial

Territory going fast. Write or wire today for full details regarding our 30 DAY FREE TRIAL OFFER. Try a new Ozarka Loud Speaker on your own radio. When thoroughly convinced of its exceptional merit, sell others. WE TRUST YOU.

OZARKA INC.

122 W. Austin Ave.
CHICAGO, ILL.

The
OZARKA
DE LUXE
RADIO
Loud Speaker



Mail This Coupon Today

30 DAYS' FREE TRIAL
Ozarka Inc.,
122 W. Austin Ave.,
Chicago, Ill.
Gentlemen: Send me
full details about your
Ozarka Loud Speakers, your
30 day FREE TRIAL OFFER
and how I can make \$50.00 weekly
in spare time.

Name _____

Address _____

City and State _____

POPULAR MECHANICS, FEBRUARY 1928
(REAR COVER)

RADIO: AS I EXPERIENCED IT

Continued from page 13

WLW reception reports came from all over the world. Crosley introduced a limited-production *WLW Special* receiver, an upgraded version of their top production line set. It had much better audio system with, I believe, six loud-speaker units made by JENSEN. The bass unit was the same as those supplied to SCOTT and SILVER for their sets. If I recall correctly, the *WLW Special* listed for \$600. I did not rush to buy one, but they did have beautiful sound, and excellent shortwave performance on all bands. A comment about the large-dial Crosley consoles of that period. All used a belt in the dial; it was almost impossible to replace that belt, even then.

Another adventure of mine in those times. A tiny 7½-watt, shortwave broadcast station was being operated by Amando Cespedes Marin (I believe I have the spelling right), in Heredia, Costa Rica, Central America. I listened to the station every Sunday morning for years. I had built a 75-watt screen grid modulated transmitter, using AERO plug-in air-wound coils, for a nearby amateur. When the transmitter was complete, the person ordering it could not pay for it. While trying to decide what to do with a new transmitter I did not have use for, I read that Mr. Marin was in need of help with his equipment. I wrote to the station several times, and ended up giving my new transmitter, complete with all tubes, along with a broadcast-quality ELECTRO-VOICE ribbon microphone, to Marin. I was listening on the *Sunday Morning* the new transmitter was dedicated, each of the about ten participants in that

day's program thanked me, by name, and stated their name. Imagine how that felt.

I would appreciate hearing from anyone who recalls the Heredia station, any information would be appreciated. I lost contact about 1938.

Incidentally, for those wondering about the origin of ELECTRO-VOICE, they made a broadcast-quality ribbon microphone, wholesaled for, I believe, \$35 in 1936, or thereabouts. I believe that was their first product. ■

WILLIAM L. HOY

William L. Hoy, 82, of Charleston died July 20, 1992, at home after a short illness.

He was a graduate of Ohio University. He was a member of UMW and retired from Truax Traer Coal Co. and FAA. He was an Army veteran of World War II. He was a member of Church of Christ, Charleston.

Surviving: wife, Ellen; son, William L., Jr. of Charleston; daughter, Brenda Mease of New Milford, Conn.; four granddaughters; one great-granddaughter.

Service was 1 p.m. Thursday, July 23, at Pryor Funeral Home, East Bank, with Minister Jerry Alderson officiating. Burial was in Sunset Memorial Park, South Charleston.

Radio Historian, writer, inventor, holder of some 50 patents and philosopher. His contributions will be missed by the Gazette staff and members.



NEWS FROM WEST VIRGINIA

by Zane W. Parsons N8OLD, Reporter

The Museum of Radio and Technology has had over 200 visitors so far this year. It opened on a regular schedule March 6, so we think attendance figures in the second half of 1992 will far exceed that of the first half. Our goal for the year is 1,000 visitors.

The Museum continues to receive coverage from the media. West Virginia Public Radio, The Appalachian Log, The Charleston Gazette, The State Journal and WSAZ-TV (the local NBC affiliate) have recently featured news items about it.

The West Virginia Chapter will have two Meets at the Museum this year, July 4 and October 24. We plan a full program of activities, including an auction, seminars, Old Equipment Contest, and tours of other local museums both dates.

If you can't make it to either of these events, come see us any weekend. The Museum is open 10 a.m.-4 p.m. Friday and Saturday and 1 p.m.-4 p.m. Sunday. It's a good idea to call ahead if you are planning to visit on a Friday. Call me at (304) 453-2915 (local Huntington number), Lloyd McIntyre at (304) 744-8082 or Geoffrey Bourne at (304) 722-4690 (Charleston numbers).

The Tri-State Amateur Radio Association will sponsor the Huntington Hamfest at the Huntington Civic Center on Saturday, August 8, beginning at 8 a.m. and closing at 3 p.m. Registration for W5Y1 testing will start at 8 a.m. and testing will begin at about 9:30 a.m. Walk-ins welcome, bring FCC Form 610 and copy

of license for upgrade. I understand that an Icom IC728 radio is the top door prize. A parking lot and parking building are nearby. Talk-in on 146.76, down 600. ■

CHAPTER NEWS

Ask about a chapter in your area.

**Contacts*

Antique Radio Club of America West Virginia Chapter

408 8th Avenue

St. Albans, WV 25177

**Geoff Bourne
(304) 722-4690*

Hudson Valley Antique Radio & Phonograph Society-ARCA

Rt. 207, P. O. Box 1

Campbell Hall, NY 10916

**Linda or John Gramm
(914) 427-2602*

Hawaii Chapter ARCA

95-2044 Waikalani Place C-401

Mililani, Hawaii 96789

**Leonard Chung*

Kentucky Chapter-ARCA

1907 Lynn Lea Road

Louisville, KY 40216

**Robert Dickerson
(502) 447-6399*

THE LADIES' COLLECTOR CORNER

by Lloyd McIntyre

I would like to apologize to all of the ladies for not starting this program several years ago. Then apologize again for not anticipating the overwhelming response and choosing too small of a room.

The ladies met for the First Annual Ladies Collector Program on Friday morning, hosted by Kathy Koester, Patti McIntyre and Barbara Rankin.

Several ladies brought their personal collectibles, which help them maintain their sanity while surrounded at home by rooms full of radios. What great collections they were. There was a fantastic display of buttons, teapots, art, glass and miniature sewing machines. I am sure the ladies' collections can equal the *Old Radio Equipment Contest*. Thanks to 35 ladies who participated. (See page 38 for pictures.)

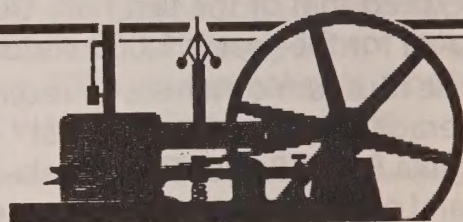
Congratulations to Millie Lyon on winning the *People's Choice Award* for her display of the Miniature Sewing Machines.

The ladies started working on their program for next year which, I have heard suggested, will feature a fashion show, luncheons and daily tours of local attractions. Special vans and tours that are just minutes away will surely allow some very creative activities for the ladies. Huntington, West Virginia offers museums, glass works, many antique and speciality shops. When additional ladies bring their particular crafts and collectibles for sharing, the ladies may have a better time than the men.

I know this sounds like we are dividing the sexes here—that is not the case. The men will enjoy the ladies' displays, tours, etc., as the

ladies often collect and participate in this great radio hobby. The idea is to have something for everyone.

The children will not be excluded, as we have a major amusement park and water slides at another park only five minutes or less away—*Next year sounds like fun.* ■



THE NEW ENGLAND WIRELESS
AND STEAM MUSEUM, INC.

1992 YANKEE RADIO TUNE-UP

The New England Wireless and Steam Museum, Inc., will hold its 1992 Yankee Radio Tune-Up on Saturday, August 8, 1992. Radio historians are invited to test-run their antique receivers—regens, TRFs, neutros, superhets, etc., on a special bench fitted with A, B, and C supplies, and providing active antenna and ground connections.

The NEWSM, located in East Greenwich, Rhode Island, has two radio stations on its premises: WDH, the only three-call-letter radio station in Rhode Island and an amateur station, W1NTE. These stations broadcast a variety of signals, including antique radio shows appropriate to the old radios at the meet.

For more information, contact The New England Wireless and Steam Museum, Inc., Tillinghast Road, East Greenwich, Rhode Island 02818; (401) 884-1710.

ANTIQUE RADIO COLLECTORS OF OHIO

SATURDAY, AUGUST 29, 1992
8 A.M.-3 P.M.

HOLIDAY INN, SOUTH
2455 Dryden Road, Dayton, Ohio
1 (513) 294-1471

Interstate 75, Exit 50A
(Dryden Rd.), North 1 block,
Wright Bros. Room.

General Admission: \$1; Sellers: \$5
per table (limit 2) if registered by August
21, 1992; \$7 per table at the door.

Program:

8 a.m.-1 p.m.: Indoor Swap Meet
8 a.m.-10 a.m.: Contest Check In
10 a.m.-Noon: Contest Voting
1 p.m.-3 p.m.: Auction

Contest Categories:

Ohio Radios; Three Dialers; Advertising; and Open (Limit one entry per person, per category).

1. The auctioneer will be Karl Koogle, ARCO President.

2. All items to be auctioned must be registered by 11 a.m.

3. The auction will continue for a maximum of 2 hours or until we have sold 200 items, whichever comes first.

4. Fees: 10% of the selling price of each item goes to ARCO or 15% for

items requiring moving and handling by ARCO staff.

Registration:

By Mail: Karl Koogle, 2929 Hazelwood Ave., Dayton, OH 45419; Phone: 1 (513) 294-8690, after 6 p.m.

PUBLIC INVITED: BRING A FRIEND!

Bring radios for appraisals, to sell or put in the auction.

DISCLAIMER

The Antique Radio Collectors of Ohio are not responsible for any personal injury, fire, theft, or any other loss of equipment which may occur during this swap meet. Make sure that you and your equipment are insured.

Meetings are held the second Tuesday of each month in the basement of the First National Bank Building, 4100 Far Hills Ave. (SE corner of Far Hills Ave. and Stroop Rd.) in Dayton. Membership dues are \$10 per year.

For more information contact, Karl Koogle, President (address and phone above) or Jim Cross, Secretary, 2817 Parklawn Dr., Dayton, OH 45440; (513) 298-5827.

'92 Tentative Meeting Topics/Events:

Aug. 29: Swap Meet

Sept. 8: *Kit Radios*

Oct. 13: *Regenerative Receivers*

Nov. 10: *Superheterodynes*

Dec. 8: *Tuned Radio Frequency*

MEMBERSHIP REGISTRATION FORM

Name: _____

Address: _____

City: _____ State: _____ Zip _____

Collecting Interests: _____

THE ANTENNAS AT RADIO CENTRAL

*Ralph Williams with Marshall Etter, Robert McGraw
and Chris Bacon*

In the ARCA Gazette Spring issue we saw how one of the world's greatest shortwave radio networks, RCA Communications, came into being, and described its primary stations at Rocky Point and Riverhead, New York. The Alexanderson alternator transmitters originally used were also covered in depth. In this issue, we will conclude the story of RCA Communications and discuss the antennas, later receivers, tube transmitters, and Teletype equipment used by the network until the end of its shortwave operations in 1978.

Putting together a radio communication system requires the consideration of five critical elements. They are, in the order of their handling of a message: Initial (customer) information processing; transmission; radiation; reception; and final information processing. For RCA's operation of Radio Central, the first and last of these elements were conversion of Teletype code into wireline signals for exchange with New York. The equipment used for transmission at Radio Central was initially the Alexanderson alternator (previously described) and later the shortwave transmitters (covered in a future issue of the Gazette). The first receivers are briefly described in this article and the later diversity receivers are explained in an accompanying article in this issue.

The element between transmission and reception, radiation, is usually the most dramatic part of a communica-

tion system design, largely because the designer has the least knowledge and control over it. In every new system, the very reason for its existence is the discovery of a new means of propagating a signal (example: satellite retransmission, which put RCA out of terrestrial radio communications) or a new way to increase the efficiency of an older system (short waves with ionospheric reflection, which changed the entire radio facility at Radio Central in the late 20s). The first installations at Radio Central emphasized another novel aspect of the drama of radiation; the major developments in the transmitting and receiving radiators themselves.

The design of radio transmitting stations used for point-to-point communications is as much concerned with antenna characteristics as with the transmitter itself. The capability of a station to launch waves in the directions of interest is as important as the amount of power generated by the transmitter, because power sent in other directions is wasted. High-power transmitters are expensive generators of radio energy; antennas can conserve that energy by sending it only in the desired direction. Therefore, the costs at the sending end of a radio link must be balanced between the effectiveness of the antenna and the power of the transmitter.

At the receiving end there is another trade-off. The complexity of the receiver has to be balanced against the performance of the

receiving antenna. The main factor for the receiving end of the link is the rejection of unwanted signals and noise (interference).

Radio Central provides the historian (and the engineer) with excellent examples of how these trade-offs were made, not only in theory but with real equipment. Because the earliest plans included the use of the Alexanderson alternators for transmitting and sensitive tuned-radio-amplifier and detectors for receiving, the amount of leakage from transmitting antennas into the receivers would be excessive unless separation and antenna directivity were used to limit the leakage signals.

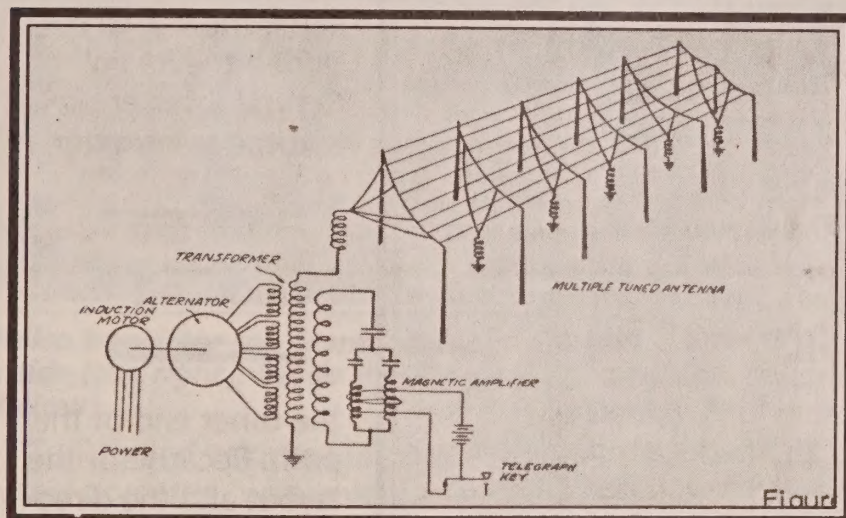
for receiving. Its antennas were laid out in a southerly direction to limit the pickup from the transmitters and to take advantage of the terrain for setting up good paths to Europe.

Before and shortly after World War I, the use of the radio spectrum for long-distance operations was limited to the very long radio waves. Experience had shown that the long waves were attenuated by the simple laws of spreading and they were confined by ground currents to the surface of the earth. (These ideas were accurate as far as they went, but did not take into effect other factors, such as ducting that have been characterized in the five

decades since Radio Central began its operation.)

FIGURE 1

During its first decade, Radio Central operated in the extra-low frequency band (ELF) on a frequency near



One effective way to limit self-interference is to desensitize the receiver during transmission, as is done by amateurs and Cbers. However, from the beginning, the early plans for Radio Central called for simultaneous operation of several paths without limiting the times of transmission or reception of any link.

RCA resolved the self-interference problem by separating the transmitting antennas from the receiving antennas. All the transmitting antennas were erected at Rocky Point in close proximity to the Alexandersons. Nearly 15 miles away at Riverhead a second facility was put into operation

15 kilohertz. Communications with Europe meant that the paths were a little north of east, and for the most part, over the Atlantic ocean. The Alexanderson alternators were operated at a little less than 200 kilowatts output feeding their transmitting antennas, (**Figure 1**). Each antenna was essentially a vertical radiator although as explained below it did not give that impression at first viewing, (**Figure 2, page 22**).

Each of the two long-wave transmitting antennas was a little more than a mile long. It was made up of 12 longitudinal conductors hung from 150' bridgearms on six towers,

each more than 400' high. At the place where each horizontal conductor went under the bridgearm of a tower, the conductor was suspended on a pair of 55" insulators. The voltage on the high conductors exceeded 75 kilovolts at full power. A downlead was used at each tower to connect the antenna conductors together and to the ground system through a tuning inductor.

Each inductor resonated with a portion of the high conductor's capacitance to earth, thereby providing a low impedance path to the conductors buried in the ground. The purpose of the multiple-tuned, series resonant circuits was to transfer the effect of the ground, i.e. the neutral pole for antenna

radiation, to the upper end of the feed from the Alexanderson. The reason for the multiple downlead circuits was to divide the ground impedance (that the upper conductors saw) by the total number of downleads. The result was an overhead ground impedance orders of magnitude lower than what would have resulted from a simply-loaded, vertical wire without the multiple resonant tuning. The radiation resistance of the vertical part of the antenna was near 0.1 ohms. The multiple ground connec-

tions resulted in an effective ground impedance of about 0.5 ohms and an antenna efficiency of 10 percent, a very high value compared to the older Marconi designs.

The first receiving antennas were Beverage wave antennas that had been developed especially for Radio Central from the work that Harold Beverage had done previously at Otter Cliffs, Maine and in New Jersey. The antennas were nine miles long,

stretching from Riverhead south toward Westhampton and Quogue. They were directional and therefore were aimed along the line that included the Radio Central receiver site and the transmitter at

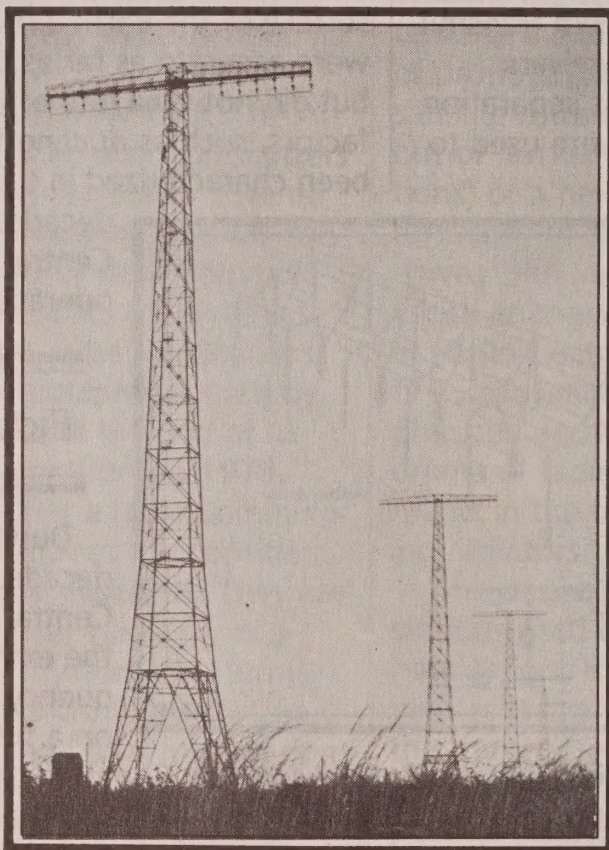


FIGURE 2

the other end of the path. Because of the layout and the directional characteristic of the wave antenna, there was substantial attenuation of the

local transmitter output of signals from Tuckerton.

The wave antenna was made of two parallel wires about a foot apart, suspended on cross-arms that were carried on poles about 10' above the ground. An incoming signal travelled along the antenna and induced a voltage in both wires that was captured by a coil connected at the end of the antenna. The voltage induced in the wires travelled in both directions along the antenna. By suitable terminating circuitry, the reverse wave

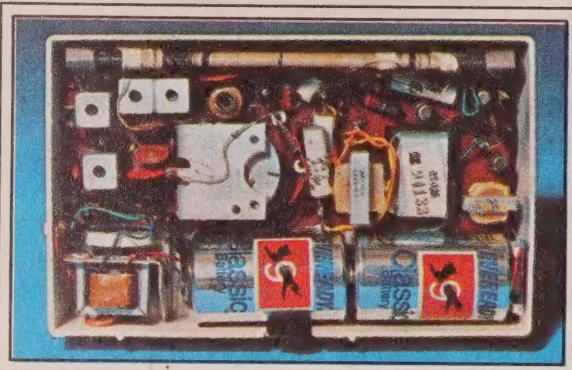
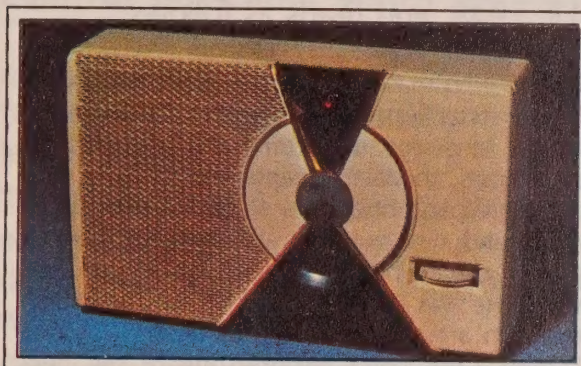
(Continued on page 39)

TRANSISTOR TOPICS

FIRST PHILCO TRANSISTOR RADIO, MODEL T-7

The first Philco transistor set was released for sale in 1956. Larger than a pocket radio, it measures 7" long by 4¼" wide by 1⅞" deep, and is powered by 2, "D" cells for 3-volt transistors. It has seven surface-barrier transistors, made by Philco, each carrying a Philco part number.

black dial section and tan with brown. Philco's earlier sets were claimed to be the *smallest radios ever to give a clear and powerful sound* and they were guaranteed for five years. Audio output transistors were L-5028's in push-pull.

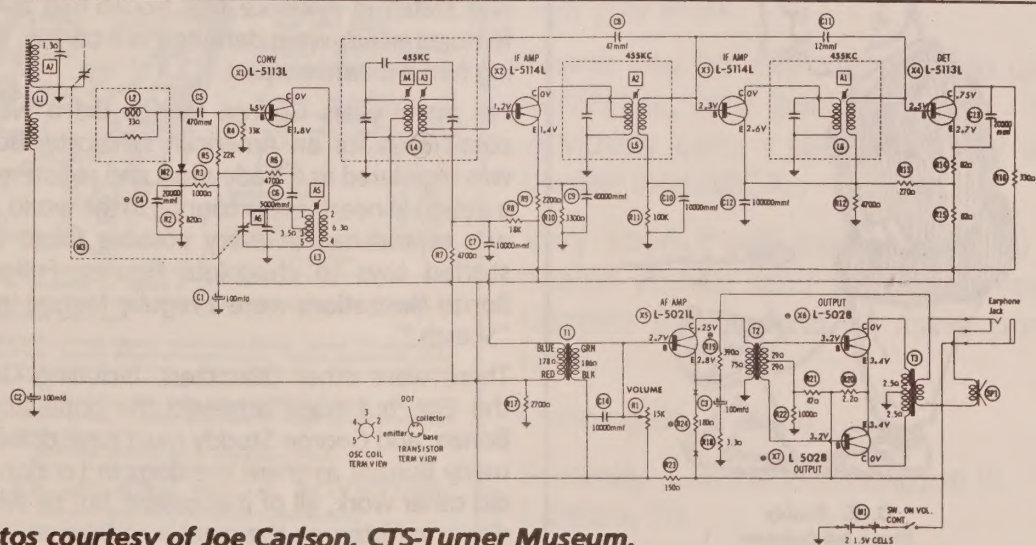


Philco transistor set, front (above); inside (top right); inside drawing (below).

Tuning and volume are both edge wheel operated, with a very attractive large diameter tuning wheel under triangular sections of the front panel. Two-tone colors included cream with

Mr. Paul Bohlander, from Philco's Landsdale plant, confirms the fact that the T-7 was first and the T-6 was later. The T-7 was assembled at the Tioga and C Streets plant in Philadelphia. (Information courtesy of William E. Denk.). Paul remembers that the surface-barrier transistors that were too slow for computer use were used in the early Philco transistor sets.

Thanks to Bill Denk and Paul Bohlander for information on the T-7. ■



Photos courtesy of Joe Carlson, CTS-Turner Museum.

He Made The World Laugh

By Les Rayner

For those of us who are interested in collecting some of radio's memorabilia, the name "Bonzo" seems to have an intriguing fascination.

This pudgy, button-nosed, bull terrier has a habit of evading many of us and makes it almost impossible to find. Bonzo is the famous "Crosley Pup" that was used to help promote the sales of the little one-tube radio that sold for \$9.75 back in the mid-20's. In fact, Bonzo was about the same size as the radio itself.

Recently, looking through one of our local antique shops, I spotted a picture of Bonzo on the cover of a rather large hard-bound book.

After opening the front cover, I first noticed the name of the publisher, not an American firm but a British company by the name of Richard Dennis of London, England.

The book was written by Paul Babb and Gay Owen on the life and work of George E. Studdy, the originator of our friend, the cartoon character "Bonzo."

What better way to convey the essence of the contents of the book than by the well written obituary as was printed in *The Kensington News* and *West London Times*, on Friday, August 13, 1948, and reads as follows:

A man who made the whole world laugh with his immortal Bonzo dog, which crossed all barriers of language and came on postcards, in magazines, chocolate shapes, car mascots, and a hundred and one other forms into homes of every land, died quietly, away from the glare of publicity, in Philbeach Gardens, Kensington, last week. He was George Ernest Studdy, aged seventy, an artist who started as an illustrator in "Comic Cuts," and became one of the best known illustrators of the day.

He began his career as an engineer's draftsman, but soon turned to humorous drawing. When the Bonzo era began, the immortal dog was a dog in every anatomical respect, a white supple-bodied bull terrier, with a broad grin and sleepy eyes. As the years progressed, the terrier became a caricature of a terrier, until the button-nosed, elephant-eared, pudge-footed creature that was Bonzo was evolved. In one infringement case it was stated in evidence that Bonzo had twenty features which were definitely not canine, making him a creature apart.

For many years George Studdy did a weekly comic strip for an American syndicate. Bonzo was registered as a trade mark and registered as a design in nearly every country in the world, and was reproduced in every possible form, from stuffed toys to chocolate figures. Full-plate Bonzo illustrations were a regular feature in the "Sketch."

There were other characters, including Ooloo the Cat, but none achieved the popularity of Bonzo, and George Studdy must have drawn as many Bonzos as there are dogs in London. He did other work, all of it excellent, but he will go down in history as the creator of Bonzo.



When he was not working (he only gave up at the beginning of his eleven months' illness), his hobby was fly-fishing, and he wrote many articles for the fishing journals. He was one of the oldest members of the London Sketch Club, and used to be a regular attendant at their Balls.

On the whole, he led a secluded life, he had a dry wit, but was a kindly and generous man, making friends easily and keeping them throughout his lifetime. He was known to many people in the neighbourhood of his home, for he had been a resident in Philbeach Gardens for about thirty years. Not all who knew him realised that he was the genius behind the millions of gaily coloured Bonzos that capered on postcards in cities and towns and villages all over the country. He leaves a widow and one daughter.

To conclude, the book is loaded with colorful postcards which depict "Bonzo" in precarious and comical situations. Further included are ads which tout woolen quilts, automobiles, even ladies' garters.

The one ad which caught my interest was the B. D. & Co. illustrating a set of radio earphones and you know who was wearing them.

Could it be the Crosley Company's ad department saw the ad and concluded "Bonzo" would help sell the "Crosley Pup" radio, maybe?



Member Letter

I am thrilled and happy to be accepted as a member of ARCA. I have found the Antique Radio Gazette greatly interesting and valuable as a guide in the acquisition/restoration of early radio equipment - receivers, tubes and literature.

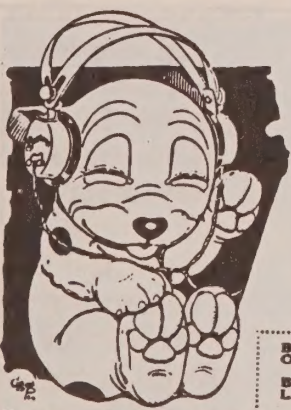
I will submit an article in time for the August 15 deadline. You can edit it any way you wish.

Thank you for the membership card, certificate, and personal letter. You obviously care. I feel personally welcomed into ARCA.

Very soon I will mail you \$2.00 to enable you to send the rather heavy Gazette in the face of rising postal rates.

Once again, thanks!

Sincerely, Carl Herman Creque III,
Culebra, PR



**Hello!
Hello!!
Hello!!!**

Let it be known that a progressive English firm now offer their

ALL BRITISH HEADPHONES

at prices and quality that will compete with any other phones on the world's market, be they of British or foreign manufacture.

BONTONE ORIGINALS . . 11/6

BONTONE LIGHTWEIGHTS 12/6

Post Free.

We guarantee to forward by return of post. We guarantee to replace if phones do not give entire satisfaction and same are returned to us within 10 days of purchase undamaged.

SPECIFICATION—Simply adjusted, comfortable and highly polished "Fraserweight" Headbands. Specially designed permanent magnets. Perfectly matched coils, wound to a total resistance of 4,000 Ohms. First quality 5 ft. thin, cards serrated Swedish Iron Pole Pieces, beautifully polished Trolive Earcups.

Remember that behind this offer is the name of BONTONE, with a sale exceeding 100,000 phones. Better value than the above cannot be obtained at double their purchase price.

BONTONE PHONES may be obtained from all Radio Stores, or direct from the actual manufacturers:

B. D. & Co. (Ed. A. BOYNTON).

Admiralty and War Office Contractors,
167-173, GOSWELL ROAD, LONDON, E.C.1.

BIG MAC

by *Larry Babcock*

You have probably observed that many fast food chain restaurants are decorated along some local motif. This probably helps attract local customers. With Grand Ole Opry in Nashville, Tennessee, radio broadcasting of country music is a popular local interest. (Grand Ole Opry has not missed a single radio broadcast since the program was started in 1925, well over 65 years ago. That's about 3,500 broadcasts.)

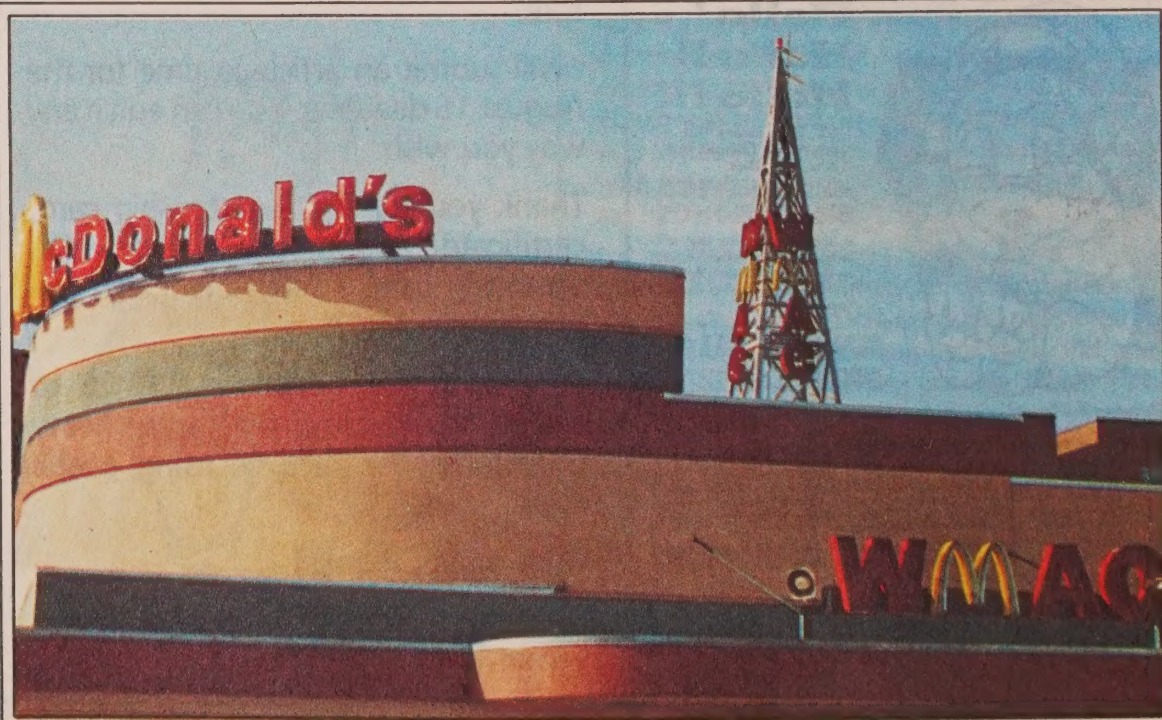
So what would be more natural than to have the theme of radio broadcasting to decorate the McDonald's restaurant near the Grand Ole Opry? McDonald's went all the way. This restaurant is a working radio broadcast station. What would the call sign be for such a station? That's easy to answer—WMAC of course. Next to the



two arches on top of this McDonald's there is a tower with "WMAC". There is another similar neon "WMAC" sign over the entrance.

Inside the restaurant contains both a working station and a museum of early broadcast. On the wall over the serving counter are mounted four real table model radios of 1930/1940's vintage.

There is also a glass enclosed studio



with two full-size manikins acting as announcers and dressed in early day costumes. They have scripts in hand and vintage microphones.

Another glass enclosure contains a third manikin, the sound effects man, with his noise-making devices. These two small glass wall rooms are right in the center of the customer eating area of the restaurant.

The present day, operating, studio is in a third glassed-in display room. It is complete with racks of electronic equipment, acoustical walls and ceiling mikes, and everything else required to run the station. A window sign notes the times when broadcasts are scheduled to be made live from this studio.

Much of the time, however, the programming is taken from tapes. This programming is monitored by everyone eating in the restaurant. What is the format of their music? When my wife and I were there recently it was all Big Band, Glen Miller. A nice diversion from the usual

music of today. This is a cute place and you should be sure to see it when you are in Nashville. It is easy to find on Rt. 155, North of Rt. 40 and about a mile North of the Grand Ole Opry and the Opryland Theme Park. ■



Page 26, top: One of two manikin radio announcers displayed in McDonald's, WMAC. Bottom: McDonald's in Nashville, TN showing WMAC call sign over entrance and simulated WMAC antenna tower. Page 27, top: McDonald's serving counter with four antique radios displayed on wall. Bottom: Sound effects man with noise-making devices.



AARP

Many of you will recognize these letters—I didn't. What happens when 33 million subscribers read an article about *Radio Days*. First, you start receiving mail in bundles; telephone calls by the hundreds. What are the results? We would like to welcome many new members to ARCA and thank hundreds of people for their very interesting stories (some of which are in this issue), as well as extend gratitude to those who want to donate equipment to a museum.

The American Association of Retired Persons may be the largest organization of its kind in the world. To have had a centerfold story on radio written by Robert P. Hey, with life-member Brian Belanger showing some of his collection and discussing his involvement in this hobby, was a real treat. If you have not seen this article, it was Vol. 33, No. 5, May 1992 issue.

If you are 50 years or over, write for subscription information to AARP, P.O. Box 199, Long Beach, CA 90801 or send \$5 for a years subscription of 12 issues.

I read about your radio club in the AARP Bulletin. I have an essay on *My Romance With Radio*, but I'll try not to turn this into an essay.

I grew up with radio and loved the serials, evening entertainment, big bands, news, shortwave and more. I still remember an older boy hooking up an antenna and ground at my house separated by a galena crystal about 1/4" in diameter with a tiny cats

whisker and headphones. When I heard a local station coming in I was bedazzled.

Later, a radio Ham helped me build a breadboard receiver, winding my own coil and with at least one tube, probably a two-tube regenerative. The first thing I heard was somebody speaking in French. I was to go on and build Heathkits, become a radio operator in the Navy, get a ham license and go to trade school to learn radio servicing.

I know you people aren't into the listening end, so much as the collecting, building and repair, but I'd like to know what you are up to.

My family had a number of radios. I don't know what the first one was. It was a box with either headphones or a separate speaker. Later, we had consoles. Among them were Philco, Atwater Kent (both Philadelphia companies) and I think the long, low one with a record player on top was an RCA. It had a two- or three-speed player under one lid and a slide rule tuning dial under the other with AM and shortwave bands. This was a model from the late 30s or early 40s. Most of the front, it seems to me, was covered with grill cloth. What cabinetry they put into those sets. They were real pieces of furniture of real wood.

I doubt if I can or will collect old radios—for reasons of limited space and money. I'm supplementing Social Security with a part-time job and have no other assets, so the budget is very limited. Still, I would be interested—out of curiosity—in knowing if people still buy and sell tubes, *variable condensers*, resistors, chokes, transformers and capacitors.

What do you think of these new

replicas of the cathedral radios with AM and FM, and a cassette player built in? One of the nice things about the (anachronistic) tape player is you could hear an old Jack Benny show through an *old* radio.

—John Kriebel, Chambersburg, PA

Please send me some information on membership in the Antique Radio Club of America. My mom has an old Zenith floor model which isn't working right now.

I listen to the radio a lot now and used to listen to shows like *X-1* and *The Shadow* when I was a kid. My maiden name is Marconi and I'm related (distantly) to the inventor of the wireless. I got your address from an article *Radio Days* in my mom's AARP Bulletin.

—Susan Hagans, Fairlawn, OH

Interested in joining your club.

Ten years ago I was turned-off re-joining an antique radio club, by a rebuff by an Eastern club—concerning my editorial praise of World War II vintage communication receivers. I flatly stated that they not only should be branded *antique* (50 years)—but will rapidly out gain in \$ the TRF's/Regenerative *Breadboards*, etc., of the 20s/30s.

Most of these military-contracted companies were short-lived, garage-size amateur radio assemblers before Pearl Harbor, then bankrupt by the new Goliaths of TV and FM. Hallicrafter of Chicago attempted switching to TV, but was wiped out by RCA, etc., in two years.

My stock of W.W.II's (including cartooned spare glass and *metal* tubes)

are: a Navy/Coast Guard contracted National NC-2-40D (10-band with 4 broadbands). Only the short-produced, Basic-NC-2-40C (all coastguard consigned) is more rare. I also have a Hammarlund 12 tube, HQ-120-X; Collins 200R (first with crystal and resonance filters); and the most widely-used by allied field operations—a Hallicrafter S-22R. I also have a B-24 radar scanner (magnetron-superhet) with ranges 10-1000 MH). In *true* antiques: 1937 Philco *Catherdral*; A. D. Dayton XL-30; Silver-Marshal; Cub-Junior (unidentified No. 50 or dates, but table model with built-in horn speakers and non scratched teakwood cabinet and many *dials/controls*.

Please send me a club application and a bulletin or magazine of your activities. Also, is there such a thing as an index catalog of antique radios and their values?

—Evan G. Wallace, Chicago Hgts., IL

Yesterday I received my AARP Bulletin May 92 Vol. 33 - No. 5 and on pages 10 and 14, was an article, *Radio Days*, by Robert P. Hey. It was most interesting. I wish more information on same and would please like to hear from you, *one and all* and anything concerning antique radios, phonographs, TVs, especially older Zenith and Magnavox sets, parts, etc. My first TV was an old Bendix B&W. What else way back when, Circa 1949-50-59? I am now 53.

All letters answered, I am enclosing a stamped, self-addressed envelope, in hopes of hearing from you. Thank you for taking the time to read my letter and for the article in the AARP.

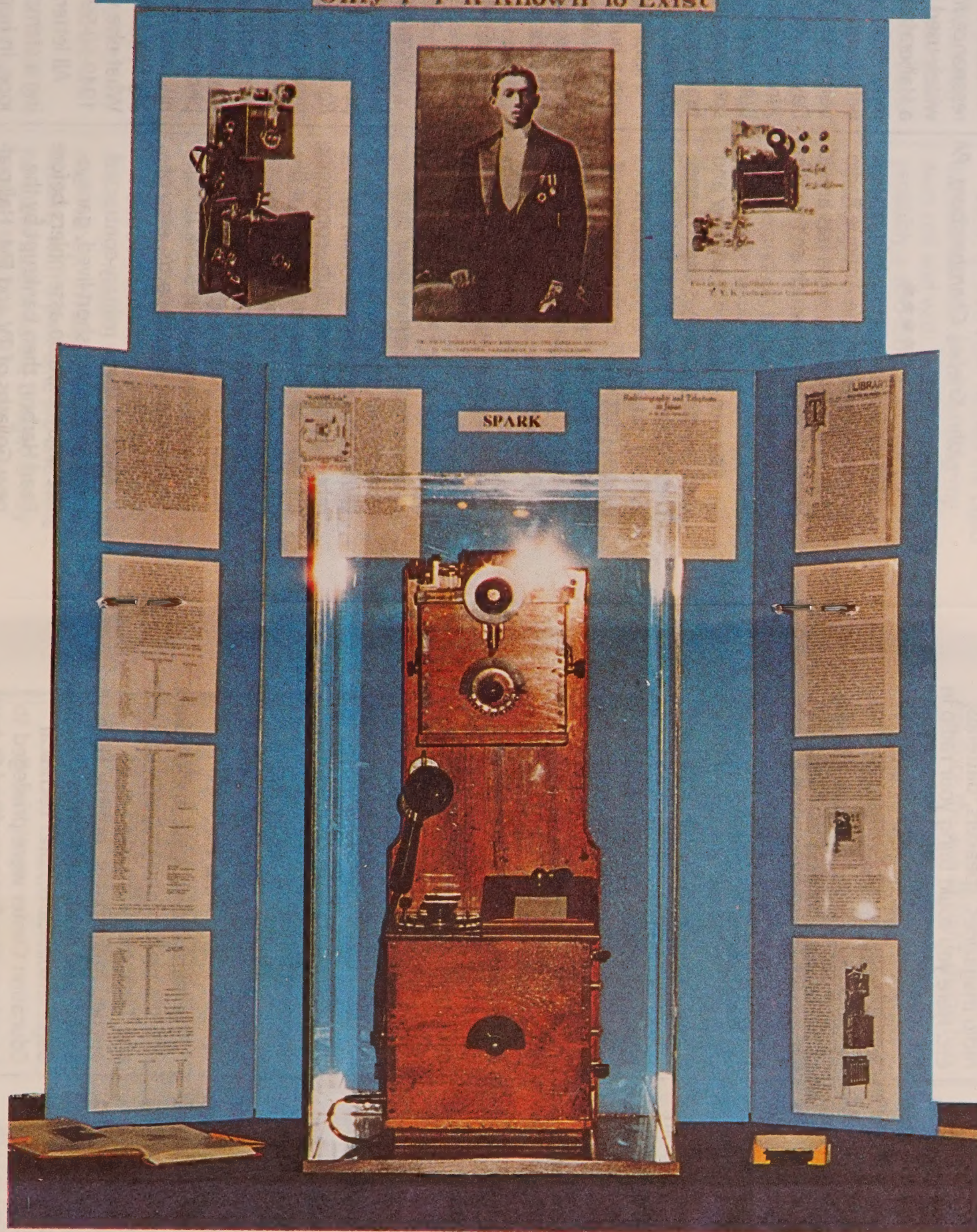
—Capt. E. D. Howes, 619 E. Romie Lane #23, Salinas, CA 93901.

JAPANESE 1910 T-Y-K RADIO TELEPHONE

INVENTED BY:

W. TORIKATA, E. YOKOYAMA & M. KITAMURA

Only T-Y-K Known To Exist



THE PRESIDENT'S AWARD

DR. RALPH MUCHOW

FULL FEATURE STORY WILL APPEAR IN THE FALL ISSUE.

A FIELD TRIP INTO THE PAST

On February 26, 1992, students from the Benjamin Franklin Career and Technical Education Center in Dunbar, W.Va., were taken on a field trip to ARCA's Museum of Radio and Technology at Huntington, W.Va. ARCA personnel, including Zane Parsons and National President Lloyd McIntyre, were on hand to show the students around, and to explain to them what they were seeing. Some of the old exhibits don't look much like radios to modern eyes!

Following are two of the many letters written by the students in appreciation of their day of exposure to the technology of the past, without which today's wonders would never have been developed.

LETTERS

Our Adult Electronics class at Ben Franklin went to Huntington to visit the Museum of Radio and Technology. At the Museum, Mr. Lloyd McIntyre gave us an orientation talk covering the museum and the purpose of its founding. During his talk, he told us about his own desires to found such a museum. His interest in radio started when he was eight years old, and since then he has collected many different antique radios. He is now the president of the Museum.

Our tour guide was Mr. Zane Parsons, the coordinator and the person responsible for the care of the facility. During our tour he showed us through several different exhibit

rooms. Our first exhibit was a recreation of an old radio store. This showed us what it was like in the 1930s and 1940s to buy a new radio, radio magazines, speakers, batteries, etc. Here you could bring your radio in for repair.

There are several other exhibit rooms, showing other interesting things in electronics. We saw a library of old trouble-shooting manuals, gift shop, and a room full of nothing but old radios. One of the rooms is set up like a classroom for teaching electronics.

The museum is located in an old school building built in the 1930s, and still requires a lot of work. With donations from the public and from commercial interests, the full potential of the Museum will be realized.

I learned from this trip what it was like in the past, and how radios were built. Over the years the active devices have changed from vacuum tubes to transistors, then to IC's and now incorporate even microprocessors.

I would like to thank Lloyd McIntyre and Zane Parsons for taking their time to help educate new students in the electronics field.

—Dennis Stanley

The memories that are enclosed inside the walls of the Museum of Radio and Technology are soon to be opened to the public, but the High School and Adult Electronics classes at Ben Franklin Career and Technical Education Center were privileged to be among the first permitted to tour the Museum before its grand opening in March 1992.

At 9 a.m., February 26, 1992, Mr. Lloyd McIntyre met with us at Ben Franklin, where we boarded a school

bus and departed for the Museum, located in the West End of Huntington, W.Va.

Upon arrival, Mr. McIntyre gave an informal introductory lecture in the Museum's auditorium. He told us that electronics has been his life-long interest since the age of eight, giving him 42 years of collecting radios and studying electronics. We were then split into several groups and the tour began.

The tour covered five rooms of radio, TV and computer displays which ranged from the 1920s up to the present. We saw such things as a Radio Repair and Sales Shop, where there were old tubes and repair parts;

one of the first transistor radios, from 1954; a library of old repair manuals, each about 6' thick; and a Museum Gift Shop. We also saw several old console TV sets and a weighted clock, which was donated to the Museum. My favorite items were the Repair Shop, Library and Gift Shop.

On behalf of the students attending the High School and Adult Electronics classes at Ben Franklin, I would like to take this opportunity to thank those who made this tour possible, and to urge that the tour of the Museum of Radio and Technology be made a permanent part of the electronics courses in the future.

—Garry Bias

OLD EQUIPMENT CONTEST

PITTSBURGH, PA

JUNE 1992

As Reported by Geoffrey Bourne

CLASS I, Crystal Sets

First Place, Radiola I, Ed Bell
Second Place, Radiola I, Clay Siedel
Third Place, Aeriola Jr., Robert Hager

CLASS II, Regenerative Sets

A. Homebrew Sets

First Place, 1927 Shortwave, Gordon Symonds
Second Place, Homebrew Regen, Robert Hager
Third Place, Ak Breadboard, Ron Frisbie

B. Factory Sets

First Place, Grebe CR-9 W/Box, Ray Hill

Second Place, Klitzen, Ernie Hite
Third Place, Tuska 224 & 226, Ed Bell

CLASS III, Super Het's

A. Battery Sets

First Place, Sampson Dead Spot, Ron Lawrence
Second Place, Brunswick Radiola, Ted Babcock

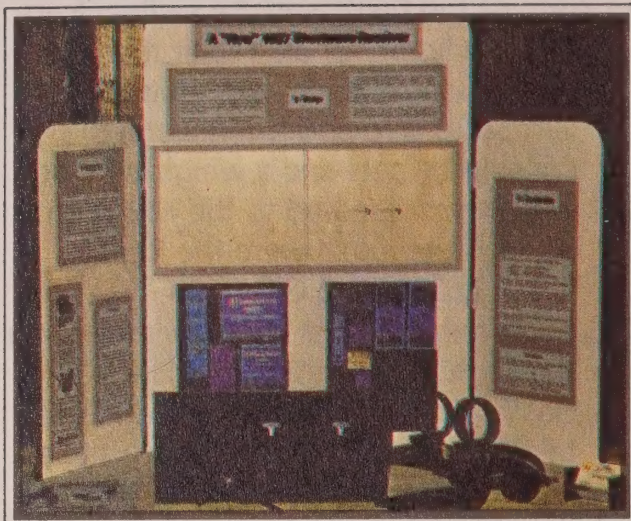
B. AC Sets

First Place, RCA 128, Geoff Shearer

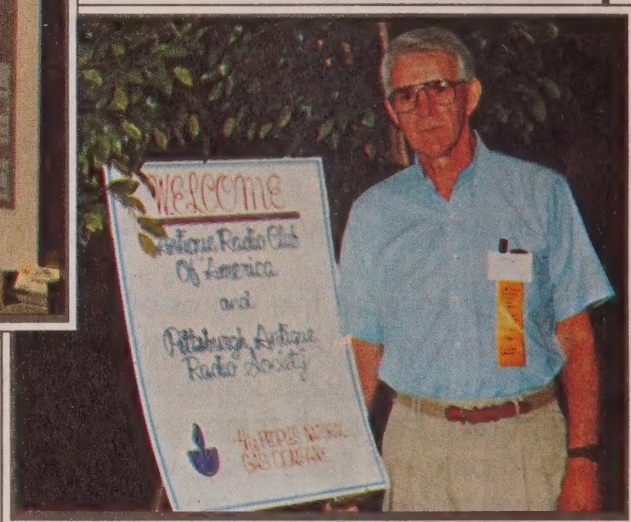
CLASS IV, Receivers with RF Amps

First Place, Amrad, Ed Bell
Second Place, AK-9 Breadboard, Ray Hill
Third Place, Grebe Synchrophase, Lloyd McIntyre

(Continued on Page 55)

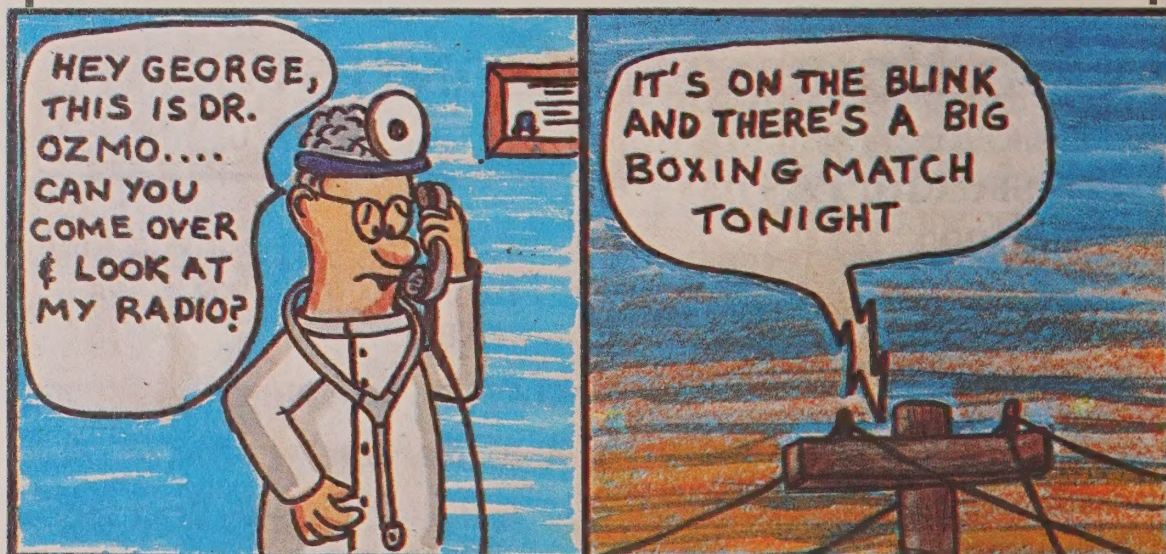


Above: John Haight, Convention Coordinator & director of PAS.
Right: Gordon Symonds' 1927 award-winning receiver display.



MR. GRIDLEY
©1992

by Ron Boucher

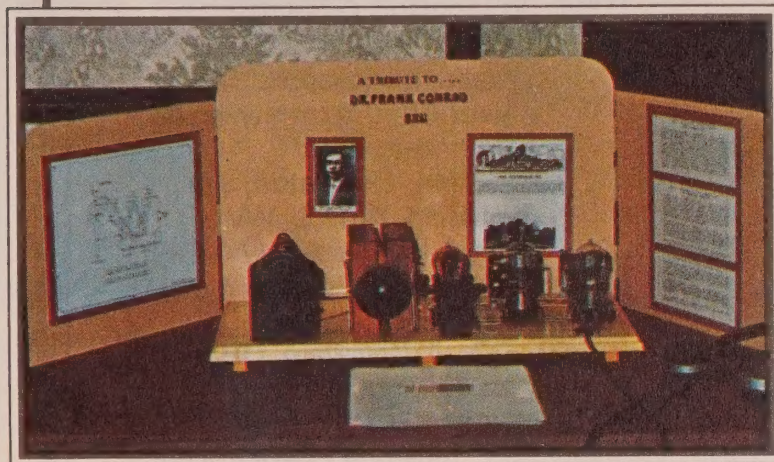




Above: Jan Frisbie and B. Bennett.



Above right: Mr. & Mrs. Stanley Ambramson.



Left: Display by John Haught. Bottom right: Philco Radio, donated to the Museum of Radio & Technology by John and Sara Haught. Bottom left: Book Review Old Equipment Contest.



Left: Many people looked at this one—it sure was nice.



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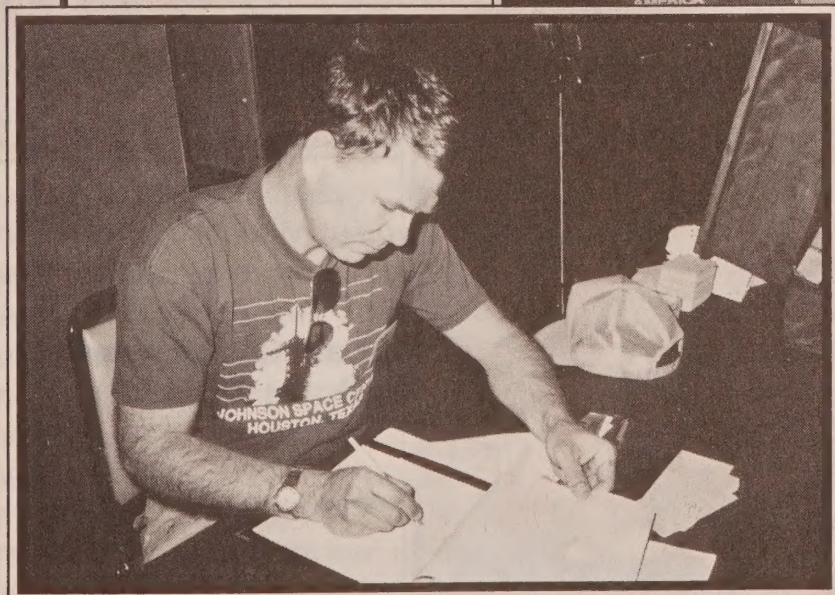
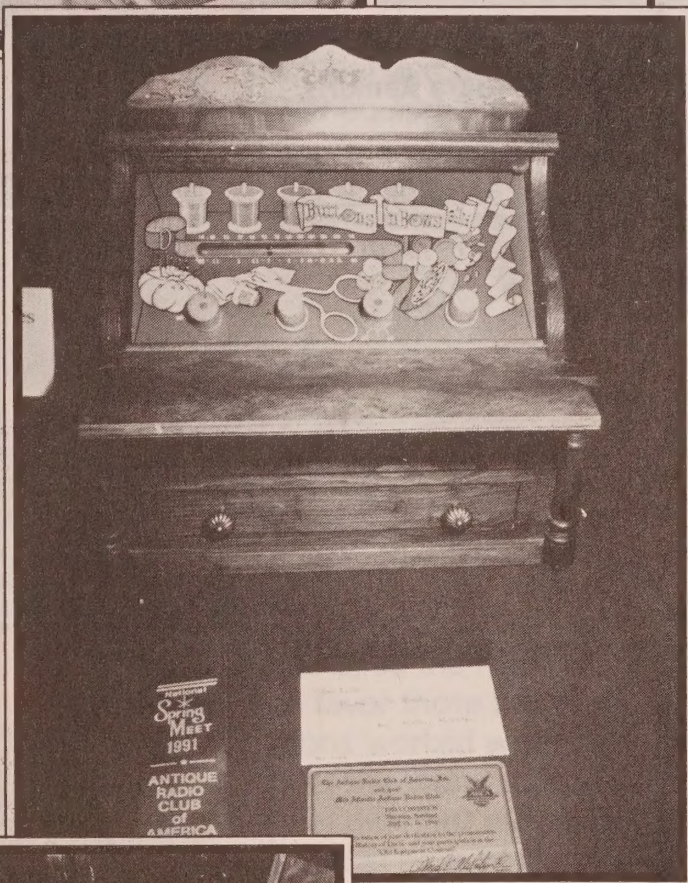
Gary K. Hummell, Pleasantville, PA
Charles T. Paterson 12-31-96,
Pretoria, South Africa
Colleen Jenkins, South Lyon, MI
Richard B. Alvin, Vicksburg, MS
William M. Powers, Kettering, OH
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Ignacio Montfort Guasch,
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Ted Wigert, LaVerne, CA
Joseph M. Lynch, Lakewood, OH
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Jim White, Lexington, KY
Jerry McPike, Campbellsburg, IN

REINSTATE

Lee Technology, San Francisco, CA
John W. Eads, Venice, FL
Dave Elliston, Huntsville, Ontario, Can.
Robert & Lenora Lund, Minneapolis, MN
Tom McGuire, Parkersburg, WV
Frank Krantz, Somerdale, NJ
Hugh Kline, Corning, NY
Ben Mast, Washington, DC
Mark Miklosz, Elmhurst, IL
Karl Koogle, Dayton, OH
John W. Johnson, Fowlerville, MI



Above: Shirley and Steve discuss business in the Trader's Market. Right: Kathy Koester's First-Place Sewing Kit Radio. Below: Geoff Boune checks his list twice on the old equipment contest.



THE LADIES' COLLECTOR CORNER

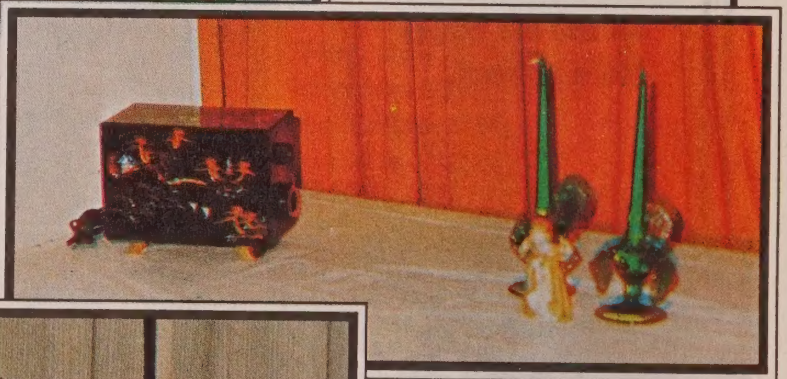


Left: Kathy Koester,
Button collection—"No
Zenith's here."

Right: Barbara Rankins,
Lithophanes.



Left: Millie Lyon, Mini-
ature Sewing Machines;
Patsy McIntyre, Tea
Sets and Teapots.



Left: Kathy Koester's
Sissors Chicks.



could be suppressed. This made the antenna unidirectional and consequently effective in reducing static emanating from directions opposite the desired transmitter.

Beverage had found that the antenna worked well using only a single wire, but by using two, the pair could be made to act as a transmission line at the same time as the pair acted as radiators. This meant that an induced wave could be converted to a transmission line wave at the far end of the antenna and be reflected back to the near end without interfering with the induced wave. Further refinements in terminating circuitry let the operator choose either end for the receiver connection. This property was fully exploited at Riverhead to obtain the best signal to noise performance that was possible on each of the five-wave antennas that were constructed at Radio Central.

The early, long wave receivers used at Riverhead were simple in concept. They used four stages of radio frequency amplification and a heterodyne detector. The output was a code signal whose frequency was selected to work directly into Teletype equipment. Interface equipment sent it on to New York where it was demodulated. The radio frequency amplifiers used typical circuitry but, because of the requirements for stability and quiet performance at the 15 kHz frequency, each had to be built on a shielded chassis enclosed in an iron box. The individual amplifiers were connected to each other by means of shielded feed-throughs. Tuning was accomplished by dials, and shafts were indirectly coupled to the tuning elements so as to offer no means of leaking signals into the amplifier compartments. The amplifiers were supported on horizontal shelves in a rack that carried three

receivers, Figure 4, Page 11, Spring '92 Gazette. Their appearance suggested trains of freight cars on parallel tracks.

When the shortwave part of the radio spectrum was found to provide reliable communications to various parts of the world, (later 1920s) RCA added transmission, reception and radiation components to the installations at Rocky Point (transmitters and transmitting antennas) and Riverhead (receivers and receiving antennas). The successful reduction of self-interference was continued by keeping the high-power equipment miles away from the receiving equipment and by feeding all antennas with carefully constructed transmission lines that were insensitive to any kind of pickup; noise, leakage or interference.

The shortwave transmitters were generally connected to rhombic antennas that were two or more wavelengths long and suspended on poles up to 125' high. Shortwave transmissions were made in any one of three bands; 3-6 MHz, 6 to 12 Mhz, 12-24 MHz, so the rhombics were sized to favor those bands. RCA Communications worked with stations all over the world. Consequently, several different rhombics had to be aimed at each of the many different reception points. Altogether there were 137 rhombic antennas at Rocky Point. The number seems excessive until it is recalled that they served different frequencies and different directions with different gains (lengths of sides and included angles) and different multiple configurations.

Any regularly used transmitting rhombic or vee antenna could be powered from any transmitter by making suitable connections in the switching yard. The antennas were

brought into the yard on transmission lines that extended as much as several miles from the yard to a remote antenna. The transmitter output lines were also brought out to the yard so that a rigger could bolt (interconnect with a semipermanent clamp) the jumpers into place, thereby closing the circuit from transmitter to antenna, **(Figure 3)**. All the transmission lines, including the interconnects in the yard, were carefully matched, open-wire lines.

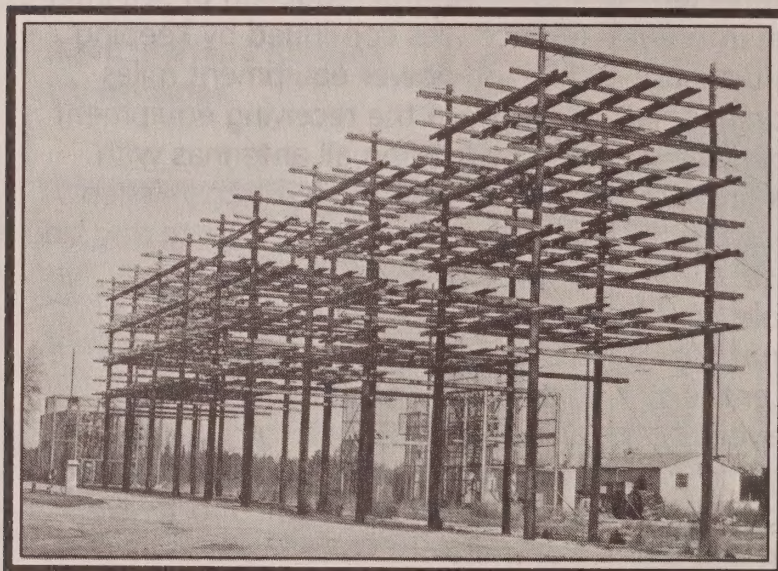


FIGURE 3

with the Beverage wave antenna, end terminations delivered the energy to the desired end of the antenna.

Rhombic antennas were also used at the receiving facility although not as extensively. There were only about 25 rhombics associated with Riverhead. These served the same purposes as the ones at Rocky Point including being switched from one bank of receivers to another as the demands of message handling changed.

Another kind of antenna came into

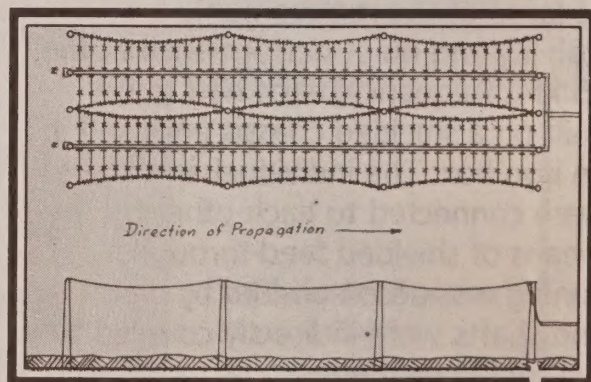
common use at Riverhead. It was called, familiarly the fishbone. It was a wave antenna and it shared its history, as well as its practical embodiment, with the Beverage wave antenna.

Each section of the fishbone was

made of 39 dipole elements loosely coupled to a centered transmission line, **(Figure 4)**. The dipoles were about 8' apart so the entire antenna section was about 320' long. It was carried on cables that in turn were supported on poles up to 125' high. When an electric wave passed along the main axis of the antenna the dipoles were excited and each coupled a fraction of its induced voltage through the small capacitor built into their supports into the 400

ohm transmission line running along the centers. The energy in the line moved in both directions. Therefore, as

The fishbones were used in pairs. They were connected in parallel to a 200 ohm line with feeders that were very carefully cut to length so that the two fishbones had a maximum response on or only a small predeter-



mined angle off their center lines. The fishbones were usually used with the diversity receivers. This meant that

three pairs, located at different places in the antenna field had to be connected to one diversity receiver. Each paired fishbone fed one of the radio amplifiers. After double conversion its signal was processed along with the other two to select the quietest output. More on the diversity receivers appears in an accompanying article in this issue of the Gazette.

Others, like the receiver building with its racks for the diversity receivers remain and give a feeling of anguish and regret for the abandonment of the station after its service ended. But the feature that in part remains, is the number of wooden poles either in place or on the ground. Originally, there were many hundreds, even thousands for the rhombics at both

the transmitting and the receiving stations, the fishbones

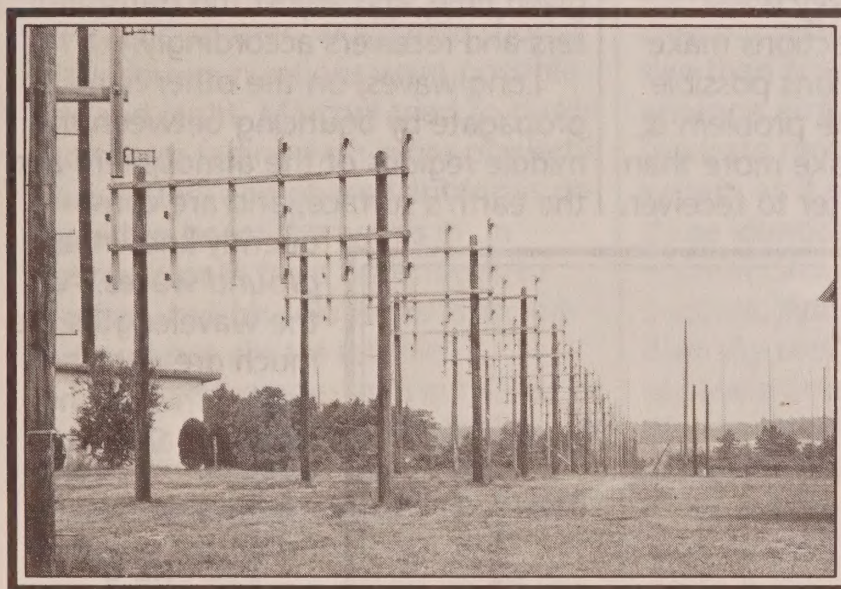


FIGURE 5

and the miles of Beverage wave antennas (**Figure 6, page 42**).

When the stations closed, some of the poles were reasigned to other

There were 50 fishbone antenna at Riverhead. As with the other seemingly high numbers of antennas, when the directionality, pairing and tripling for diversity and different frequencies of operation are considered, the number of antenna borders on the minimum number that it took to maintain the extremely high quality of service for which RCA Communications was known. As with the antennas that served the transmitting facility, the receiving antennas were brought to the receiver building on transmission lines as long as several miles (**Figure 5**). There they were interconnected with the related receivers by means of a patch panel inside the receiver building.

There are many striking features about Radio Central. Some, like the Alexandersons and their mile-long transmitting antennas are gone.

functions, some were dismantled and sold for other uses and some were just left. Walking around the antenna farms makes stunningly clear what the facility once looked like and gives a strong feeling of magnitude of the operations at their peak. Studying the service, being a friend to the people who made the service real and writing about their work has been a truly inspirational experience.

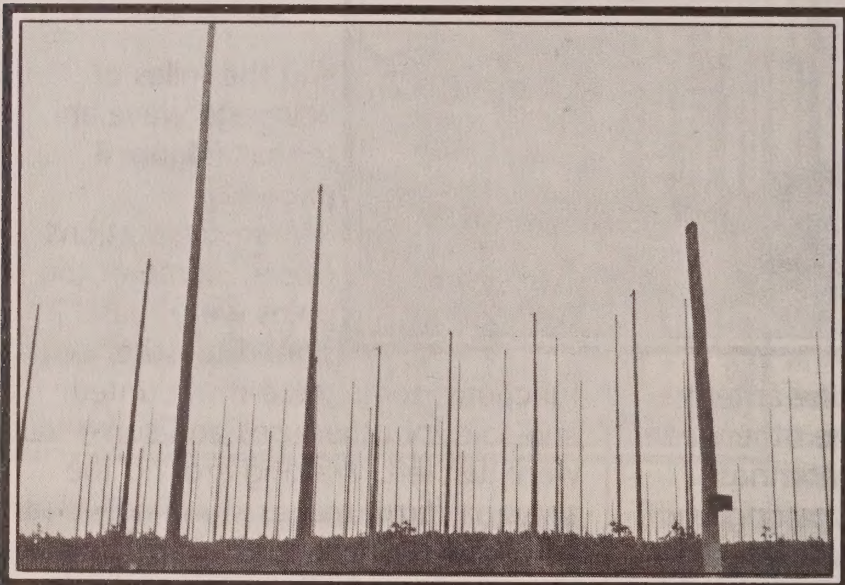
DIVERSITY RECEIVERS

RECEIVING SYSTEM USED AT RCA

by Christopher Bacon

If you've ever listened to short-wave radio, it's happened to you. A

signal comes in strong, then suddenly becomes distorted or starts fluttering. Retuning the receiver doesn't help, but other stations come in fine. A few moments later, the station that was garbled comes in perfectly clear again. This is *short term fading*, which is a consequence of the way radio waves reflect in the ionized upper layers of the earth's atmosphere, or ionosphere. Also known as *sky wave* propagation, these reflections make shortwave communications possible over great distances. The problem is, the waves sometimes take more than one path from transmitter to receiver.



If these paths differ in length, the waves arrive at the receiving antenna out of phase with each other. Depending on the differences in their phase and strength, they may cancel, and the signal gets distorted or flutters. Anywhere from a few milliseconds to a few seconds later, the paths shift and the waves no longer cancel, so the signal gets clear again. Short-term fading is normally not noticeable in ordinary Morse telegraphy because the *dits* and *dahs* are usually longer than the cancellations, but it will distort audio. Needless to say, it completely ruins high-speed Morse, Teletype, facsimile and data signals.

The gradual fading that occurs on the shortwave bands with the hours of the day, seasons of the year, and sunspots is due to the effects of solar radiation on the ionosphere, and is different than short-term fading. While nothing can be done to eliminate gradual fading, it is fairly easy to predict which frequencies will work for a particular path at any given time, and adjust the transmitters and receivers accordingly.

Long waves, on the other hand, propagate by bouncing between the middle regions of the atmosphere and the earth's surface, and are conse-

quently known as *ground waves*. As the wavelengths are much greater, they rarely arrive at the receiving antenna

FIGURE 6

completely out of step with each other, so short-term fading is almost never a problem.

Heinrich Hertz had demonstrated the existence of radio waves in 1880, using short wavelengths. But owing to the difficulties in designing practical shortwave receivers and transmitters, and the fact that shortwave propagation over great distances was not then thought possible, the bulk of commercial development was concentrated on long wave radio for decades afterward. But, by 1925, most radio engineers recognized the advantages of shortwave radio (freedom from crowding, less natural and man-made interference, and less cumbersome and expensive facilities), yet short-term fading made many believe that

sky waves would never be reliable enough to replace ground waves for commercial purposes.

Nighttime transoceanic communications on the *commercially useless* shortwave frequency of 1.3 MHz (230 meters) were discovered by amateur radio operators in 1921. Marconi astounded the world a second time in 1924, when he found that at wavelengths of 30 meters (10 MHz) and shorter, worldwide short-wave communications were possible day and night. Marconi tried to tackle short-term fading with more powerful transmitters and phased antennas designed to beam the waves in an optimum path from transmitter to receiver, but his solution was expensive and not always reliable.

Harold Beverage, then in charge of receiving systems at RCA's facilities in Riverhead, followed these experiments with great interest. As related by Bob McGraw, Beverage was copying shortwave signals one night at his amateur station W2BML while on the telephone with a fellow Ham who just happened to have his receiver tuned to the same station. They noted that the signal faded in one location but not the other. With this insight, Beverage and his associate Harold Peterson began experimenting with multiple antenna and receiver arrangements. They found that with two antennas separated by several wavelengths, the signal seldom faded out on both at the same time. With three antennas spaced about 1,000' apart in a triangular pattern, and three separate receivers, the resulting difference or diversity of fading allowed them to maintain usable signals in spite of short-term fading. Beverage and Peterson applied for a patent on this system, which they called *diversity reception*, in 1926, which was

granted in 1931. RCA started installing shortwave equipment in 1927, and by 1930, most of its operations had been moved to HF. Some long wave receivers and the Alexanderson alternator transmitters described in Part I of this series were retained until the early 1950s for backup service during electromagnetic storms.

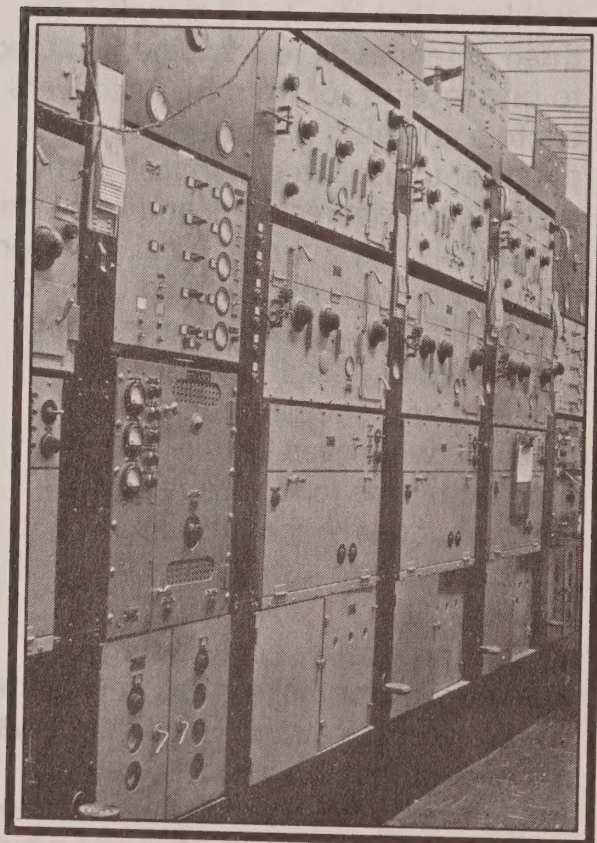
Aside from the satisfactory operation of the Beverage and Peterson diversity system, it was far less expensive than Marconi's transmitters and antenna arrays. In addition to three separate receiving antennas, the system as it eventually developed had three identical superhetrodyne receivers and circuitry to combine their outputs. Although the advantages of diversity reception are more due to the separate antennas than to the method of combining the signals, the phasing problems that resulted if signals from three antennas were combined and fed to one receiver, or from three converters to a common IF made it more practical to use three identical, completely separate receivers and combine the signals only after the final detector stages. Beverage and Peterson found that two antennas and receivers outperformed any single antenna and receiver, and three antennas and receivers were even better. Four or more antennas (and receivers) were somewhat better than three, but not sufficiently so to justify the additional expense.

The three-set diversity system worked well for make-break keying and voice communications. However, it was discovered that in addition to amplitude diversity fading, radio waves also have diversity frequency changes which caused phasing difficulties when frequency shift keying was tried. This problem was manageable when two receivers were used, but not three. While the early diversity sets at RCA

had three receivers, only two at a time were used once frequency shift keying was adopted for Teletype channels. The third was kept in standby, or could be used for other operations if necessary. Later, diversity sets were made with only two receivers.

FIGURE 8

The original diversity receivers (**Figure 7**) at RCA had plug-in coils and tubes typical of the late 1920s. They used TRF front ends with regenerative detectors, and according to Marshall Etter, a complete set could easily be considered the largest radio ever made. The coils were *hot* with the 250-volt B+ supply, and every operator made the mistake of reaching in and grabbing the coils before turning the power off but usually only once.



By 1935, improvements in tubes and circuitry made it practical to redesign the receivers. The *standard* RCA diversity set, based on the 1935 design, was truly an impressive piece

of equipment, even though it was slightly smaller than the older versions.

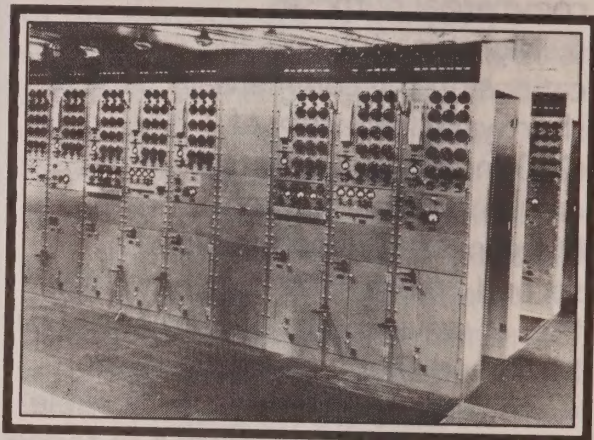


Figure 8 shows a row of three complete sets at Riverhead in 1935, with additional rows of sets in the background. Each set consisted of three RF units, three IF units, an assortment of output units, signal and power control panels, power supplies, and antenna patch panels. Each of the dual conversion superhetrodyne receivers could be used independently, or in any combination for diversity operation. Fully assembled, each set occupied four, full-height racks, weighed nearly a ton, and contained 140 vacuum tubes and one Tungar rectifier. Twenty meters

FIGURE 7

were used to monitor signal levels, plate currents and power supply volt-

ages. The sensitivity (noise equivalent) was rated at better than 0.8 microvolt. The quality of the components and construction was in a class by itself beyond military spec. **Figure 9, page 45,** shows one complete receiver at Riverhead in 1975, shortly before the station was dismantled. This receiver was donated to the AWA Museum in East Bloomfield, New York.

The RF units covered 3-24 MHz in three bands. Each band was a separate superhetrodyne channel with three tuned RF stages, a mixer, and an oscillator, individually tuned with

National Velvet Vernier tuning dials. While five separate tuning controls per band were a bit much for *dx-ing*, they could easily be preset to a desired frequency with the aid of the calibration cards seen mounted to the left of the meters on the RF units, and then *fine-tuned* to a degree not possible if the tuning capacitors were ganged. The frequency range of each channel was limited to a 2:1 ratio for linearity. The bands were 3-6 MHz, 6-12 MHz, and 12-24 MHz, corresponding to the ranges of frequencies used during the day, evening and night hours, respectively. Bandswitching was accomplished by turning on the tube heaters in the desired channel. (The oscillator heaters were left on at all times for stability, and their plate voltages were switched instead.) By switching

power instead of RF, the noise, losses and

erratic operation experienced with conventional band-switching or plug-in coils were completely avoided. Of course, band changes took some time, as the tubes for the desired band had to reach operating temperature before the radio could be tuned, but one had to remember that these receivers were designed to be set to a specific frequency and then left there for hours.

The 450 Khz output of each RF unit was connected to an independent IF unit. The IF units had two stages of amplification at 450 KHz, which fed three separate converters for three bandpass filters. The 450 KHz stages did not provide gain, but were used to establish the overall selectivity of the receivers. Again, the desired bandpass filter was selected by turning on the heaters of its associated tubes. Five filters were available

for telegraph, telephone, and broadcast reception as options that were specified for a particular application. The converters were fed from a common 400 Khz oscillator, and the 50 Khz heterodyne signal from the selected bandpass filter was passed through three additional stages of IF amplification. A push-pull detector supplied the main output of each IF unit, and an auxiliary detector with its own audio amplifiers was provided in each unit for monitoring.

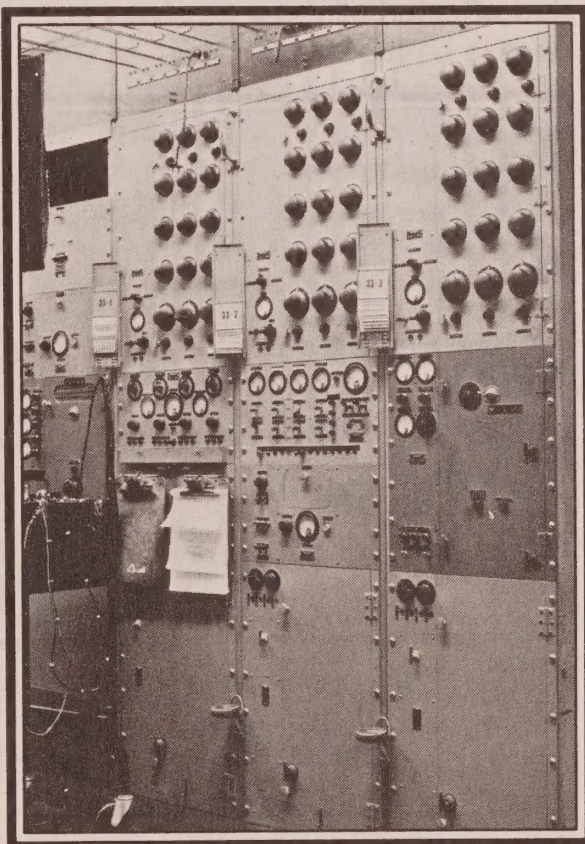


FIGURE 9

The method of selecting the receiver to take the final output from was elegant in its simplicity. An AGC voltage was developed in each receiver and these voltages were connected in parallel. As the signals reaching the antennas faded in and out, the receiver with the strongest signal produced the greatest AGC voltage, which *pulled down*, or reduced, the gain of the other receivers. If the signal faded out on the antenna in use, it would still be receivable, or increasing in strength,

on one of the other antennas. The AGC voltage of the *active* receiver dropped, increasing the gain of all the receivers in the group. The next one with the strongest AGC voltage then pulled down the other two and continued to provide the output until the signal on its antenna faded. Since there were no relays, the output instantly shifted to the receiver that had the strongest signal, and the system automatically compensated for overall changes in signal strength that affected all three receivers at once.

them in a fashion that avoided errors in the Teletype printout. The gates in the FSK unit were fast enough that the mark signals could come from one receiver and the space signals from the other and nobody would know the difference.

The other parts of a standard diversity set were the power control panel and the signal control panel. The power control panel contained separate switches and fuses for each of the receivers and the output units, along with a milliammeter that could be plugged into test jacks on the other

units for troubleshooting. The signal control panel had switches for routing the signals

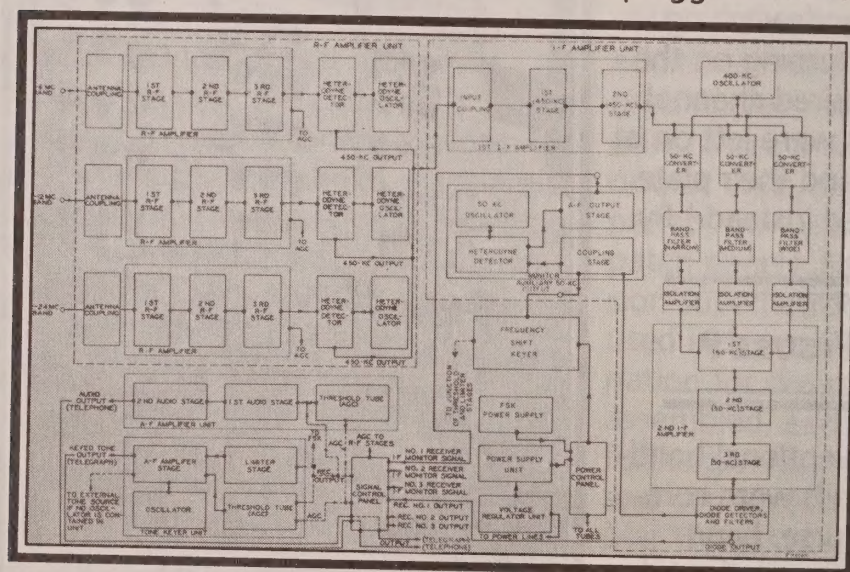


FIGURE 10

from the receivers to the various output units, and from the output units to the rest of

Three different types of output units were available, and various combinations were used depending on the application of the set. An audio output unit, with its own *threshold*, or muting tube, was used for voice or radio program reception. A tone keyer unit, containing a variable frequency audio oscillator, keyers, and amplifiers, was used for telegraphy, facsimile, and Teletype. A frequency shift keyer, or FSK unit, containing two separate discriminators, along with gates and triggers, was used to drive the tone keyer while receiving frequency shift transmissions. The 50 KHz IF outputs of two of the receivers were fed into the FSK unit, and it switched between

the world. It also had millimeters for measuring the AGC action of each receiver, as well as the combined output of the set.

Figure 10 is a block diagram of single RF and IF units, with the audio, tone keyer, FSK, and power supply units. Connections are shown from the signal control panel to the other two RF and IF units, which were identical to those shown. **Figure 11, page 47,** shows a smaller, later version of the set which used miniature tubes, but was otherwise identical to the *standard*.

With the addition of master oscillators and some other modifications (**Figure 12, page 48**), many of these receivers were used for single

sideband reception. *Standard* diversity receivers were used with only slight modification for voice and radio program reception until RCA Communications abandoned its shortwave operations in 1978. Even then the engineers were only willing to concede that radios might be made smaller, but not better.

TELETYPE

DEVELOPMENT OF TELETYPE EQUIPMENT USED AT RCA

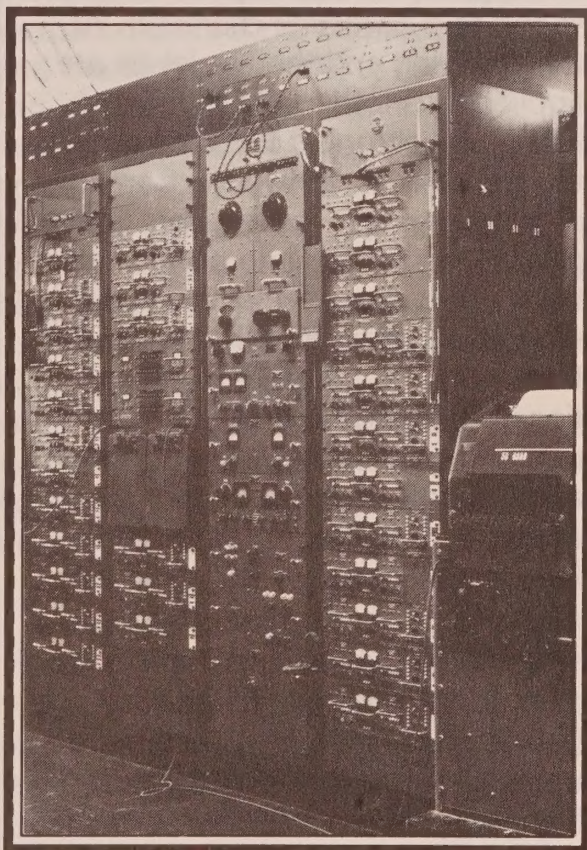
by Christopher Bacon

Teletype is a word much like *Kleenex*, initially the trade name of a particular product, and now a generic term. It came into our language because until the advent of digital communications, the electro-mechanical devices manufactured by Teletype Corporation and other companies were used almost anywhere printed information had to travel electrically.

While most of this equipment was originally designed for land-line telegraph systems, it was adopted by, and became indispensable to short-wave radio networks like RCA Communications. Not only was RCA a shareholder in Teletype Corporation, but mechanical engineers on the staff of the New York Office of RCA Communications devised modifications and improvements to make the machines more suitable for radio use. RCA Communications was also a worldwide sales and leasing agent for Teletype equipment.

Economics was the primary reason for the development of machines

that could print messages by wire. Prior to their introduction, most electrical communications were handled by telegraphy, and good telegraphers were an expensive commodity. Machines that could be operated by regular typists would greatly reduce labor costs and potentially increase the number of messages that could be handled by each circuit. Although a number of *printing telegraph* and *typewriting telegraph* schemes were proposed and tried as early as 1837, most required as many skilled operators and technicians as the telegraphers there were supposed to replace, and it wasn't until the turn of the 20th Century that such machines came into widespread use in American telegraph systems.



The essence of the problem was to find some way of coding the 50 or so characters our written language makes use of (26 letters of the alphabet, 10 numerals, punctuation marks, and various miscellaneous symbols)

onto a telegraph line where the only conditions were current on, or marking, and current off, or spacing. The code, of course, had to be suitable for mechanical transmission and reception. While Morse code, with its one-unit *dit*, three-unit *dah*, and one, three, and five unit spaces is easy enough for humans, it is very difficult to decode mechanically. The first practical coding scheme for machines was introduced in 1874 by Jean Baudot in France.

In Baudot, every character is represented by a combination of five marks or spaces.

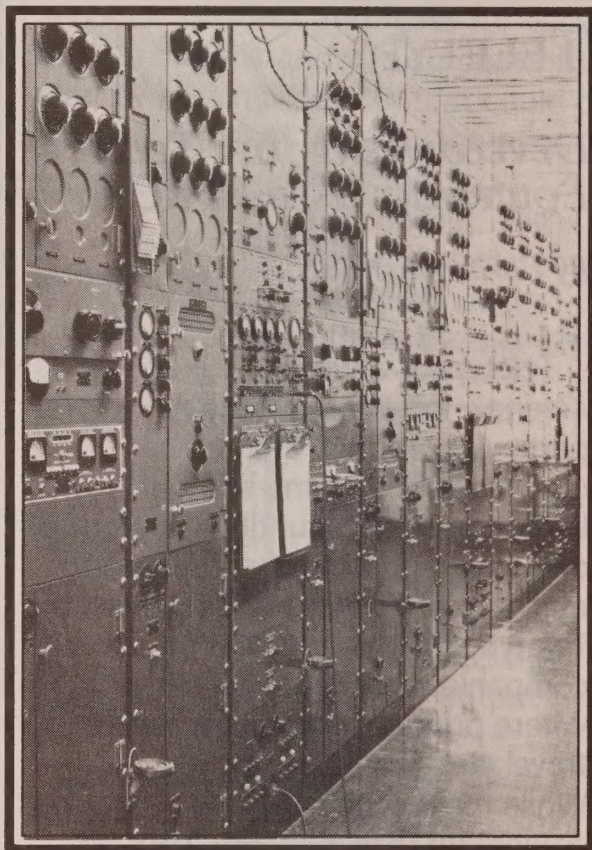
Transmitting is accomplished by using a rotating

FIGURE 12

switch to sequentially send the five levels (marks or spaces) that correspond to a particular character. At the receiving end the five levels are applied by another rotating switch, kept in synchronism with the one at the transmitter, to five electromagnets which move locking bars in a printer mechanism into position so the correct character will be typed when the printer is activated. With five levels, a total of 31 combinations is possible. In order to accommodate numbers and other symbols, along with printer commands, such as space, carriage return, and line feed, the concept of shift functions was introduced. Instead of using the shift key for upper case characters, as is done on ordinary typewriters, a Baudot machine types all letters in upper case and pressing the shift key gives access to the numbers and miscellaneous characters. The original Baudot code is known as International Telegraph Alphabet Number 1, or ITA 1.

The Baudot system was improved upon by Donald Murray, working in England, in 1889. Murray developed

a simplified and more reliable printer, along with an enhanced coding scheme based on Baudot. Murray's code, ITA 2, obsoleted the original Baudot code. In the Murray system, synchronization of the printers was handled automatically by the rotating switches, or multiplexers. Transmission also had to be synchronized with the multiplexer at the sending end.



This was accomplished by having the typist operate a machine that punched the code on a paper tape. The tape was then passed through another machine that read it back with the proper timing. It was found that this technique was useful in other ways; the tape provided a record of what was sent and a message could be retransmitted as many times as necessary. Tapes could be prepared at whatever speed the typists were capable of without slowing down or outpacing the rest of the system. With high speed punches for receivers, the multiplexers

could be sped up, thereby increasing the capacity of a telegraph circuit to its limits, and the tapes made at the receiving end could later be typed out by printers operating at normal speed.

Interestingly, the term *Baud rate*, which means the speed of data transmission in today's computers and digital systems, is in honor of Jean Baudot even though Murray's code was the one actually used. The system envisioned by Murray was used to a great extent in the United States by Western Union and AT&T. The equipment was built by Western Electric, with numerous improvements made by the engineers of all three organizations. While the delicate relays and multiplexers required careful maintenance, the investment in equipment and personnel was justified for telegraph circuits that carried constant, heavy traffic. But the system, which required several pieces of machinery and dozens of relays, was not particularly suitable for small installations in a customer's offices.

The first successful self-contained machine that any typist could use was developed by Joy Morton and Charles L. Krum. Essentially, an electrified typewriter, it used the five-level code and was similar in principle to the West Electric equipment. The Morkrum machine, as it was called, was originally intended for the railroads and for intercommunications in offices, factories, and hotels, but its first widespread use was by the Associated Press for wire news service in 1915. At the same time, Edward Kleinschmidt independently built a similar machine which also became popular.

In 1925, the Morkrum and Kleinschmidt Companies merged and became Morkrum-Kleinschmidt. AT&T

bought the firm in 1930, renamed it the Teletype Corporation, and made it a subsidiary of Western Electric. The exact derivation of *Teletype* is uncertain; many old-timers say it was a cross between telegraph and typewriter, but literature from the company suggests that teletype means *typing from a distance* just as television means *sight from a distance*. *Teletype* remains a registered trademark of the Teletype Corporation, which is still in existence today as part of AT&T's computer and business products division, and *teleprinter* is actually the correct word for machines made by other manufacturers.

That the machines were flexible and usable just about anywhere led to an explosion in their use on telegraph networks of all sizes and for private intercommunications. Manufacturers used them, for example, to send shipping instructions from their sales offices to their warehouses. The armed services used thousands of the machines for a variety of purposes. Telex services allowing anybody with a machine to dial up other machines and communicate, much the way fax machines are used today, were introduced by AT&T, RCA Communications and other organizations. It also allowed RCA Communications to offer leased radio channel services to many of its larger customers who purchased or leased the machines.

Most of the Teletype machines used initially by RCA Communications were the model 14 tape printer, developed by Morkrum-Kleinschmidt in the 1920s, and the model 15 page printer, which was introduced by Teletype in 1930. (To give some idea of how long-lived these machines were, the model 14 was still carried as a typing reperforator that both punched a paper tape and printed the message on the tape in Teletype

catalogs of the late 1950s, and model 15 printers were still used by AP and UPI at small newspapers and radio stations well into the 1980s.) They differed from the earlier Western Electric machines in two major respects. First, they used the *stop-start* principle, which allowed each printer to operate independently. Secondly, they did not require separate multiplexers to encode and decode signals; these operations were handled mechanically inside the machines. They were typically geared for 60 word-per-minute operation, but the flexible design of the machines permitted speeds up to 110 words per minute simply by removing two gears and replacing them with others giving the desired speed.

magnet to pull some of the levers in one direction. Spacing signals won't energize the electromagnet, and the corresponding levers remain in their normal position. The levers set up locking bars on a typewriter mechanism; after the fifth mark or space is received, one typebar carrying the desired character will be free to move. A pullbar is then released, which catches the freed typebar and smacks it against the ribbon and paper, printing the character. The *stop* signal at the end of the character holds the clutch disengaged, and the machine waits until the next *start* is received.

Where commercial AC power was available, synchronous motors were used to drive the machines. In locations with DC power, or where the AC was of uncertain frequency (as was the case on board most ships), universal motors with governors were used. But, even with synchronous AC

In radio operation, it was found that simple make-break keying was unreliable because the machines could not distinguish between a series of space signals and a complete loss of signal.

In *stop-start* teleprinting, start and stop signals are added to each character. They are created automatically by the keyboard or paper tape reader at transmitting end, and are not printed or punched on the paper tape at the receiving end. *Stop* is a marking, or current-on signal, and is present until a character is about to be sent. Each character begins with a start signal, which is spacing, or current off. It releases a selector electromagnet in the printer, engaging a clutch on a shaft geared to the motor in the machine for one revolution. During that revolution, cams on the shaft release five small levers in sequence. The mark signals of the particular character being received cause the electro-

motors, the printers would eventually drift out of step with the transmitters unless some means was used to keep them locked together. The solution was to have the printers run slightly faster than the transmitters and then make the *stop* signal longer than the others. This gave sluggish printers a chance to *catch up* before the next character was sent, while faster printers simply waited a little longer before starting the next cycle.

In radio operation, it was found that simple *make-break* keying was unreliable because the machines could not distinguish between a series of space signals and a complete loss of signal. Consequently, the concept of frequency shift keying was

applied. Frequency shift keying is nothing more than using two frequencies at the transmitter, one to represent marking, the other for spacing. The transmitter remains on continuously and merely switches between the two frequencies, which may be separated by as little as 42 Hz. At the receiving end a discriminator circuit, similar to those used in FM radio, detects the two frequencies and triggers the appropriate voltage for the electromagnet in the teleprinter. With this arrangement, a spacing signal, no matter how long, is indicated by the presence of one of the frequencies while a loss of signal is evidenced by the absence of both.

While many of the concepts developed in mechanical teleprinting are still very much alive and well today in digital communications, the motors, gears, shafts, and levers are gone. Modern electronic equipment may be much faster, smaller, quieter, and capable of far more, but it just isn't nearly as much fun to watch.

CONCLUSION OF RADIO CENTRAL REPORT

There is perhaps no better way to understand the workings of a network like RCA Communications than to follow a message on its way to its destination. Originally, message handling required a number of hands along the way. One walked into an RCA Communications office, filled out a message blank, and paid the appropriate toll. If there was no RCA office nearby, the local Western Union office could take the message and transfer it to RCA. (In other countries, the national telegraph

organization would handle the message instead.) Messages were routed to the nearest RCA Central Office, where they were converted to high-speed Morse code using punched paper tape. The tape keyed a mechanical tone-wheel audio oscillator, which fed telephone lines to the transmission site on the appropriate *circuit* for the destination. At the transmission facility, the audio Morse code was used to key the transmitter, and the message was on its way.

At the receiving site, the message was converted back into audio Morse code for another telephone line hop to the Central Office nearest the destination. There, a high-speed ink recorder would generate another paper tape, which was read by a human operator who typed it out on another message blank. This was taken by a messenger to its final destination. Of course, if the final destination was outside the range of the messengers, it would be handed off to the local land-line telegraph system for delivery. The message areas of the Central Offices looked like the United Nations in miniature; each circuit or group of circuits serving a particular country had a desk with its own ink recorders and operators. Signs were posted above the desks indicating the particular nation being handled.

RCA handled much of its own cross-country traffic in the early days, with radio links to most major American cities. These links were shut down by government order at the outbreak of World War II and, except for the one between New York and San Francisco, they were never reopened.

Voice and radio program relays followed similar procedures, except there was no conversion to Morse code. Also, high-quality, equalized telephone lines were used to maintain the fidelity of radio broadcast material.

The first big change in the system came with the introduction of Teletype equipment in the 1930s. No longer was it necessary for an operator to convert code on paper tape back to readable form; the machines printed out messages directly. As the demand for circuits grew, multiplexing schemes were developed. These employed mechanical commutators, with the machine at the sending end synchronizing the one at the receiving end. Start-stop Teletype signals could not be used with the multiplexers (as the commutators ran much faster than the Teletypes did, only sampling portions of the marks and spaces, the stop signals were rendered meaningless).

In addition to speeding the entire network up, Teletype made possible some other significant changes in message handling. The machines could be located in customers' offices, allowing RCA Communications to lease channels, thereby eliminating many of the intermediate steps in the process. Customers could lease an entire channel, or they could share a portion of a multiplexed channel with other users. Some leased channels, such as the famous *hot line* put in place between Washington and Moscow to prevent an accidental nuclear war, bypassed the Central

Offices and travelled from the stations directly to their destinations over telephone lines.

Interestingly enough, not everything at RCA was updated. For many years after the introduction of Teletype, a simple DC telegraph system was kept in place for internal communications between Rocky Point, Riverhead and the New Central Office, and Morse code was used between the operators of all the stations in the network.

Perhaps the only sure-fire success formula in business is to create a need, and then fill it. Time and time again the truth of this statement has been demonstrated by utilities, broadcasters, oil companies, automobile manufacturers, and so forth. For RCA Communications, it was no different. Having made inexpensive, reliable, and fast communications to almost any part of the world a reality, it was only a matter of time before the shortwave network was overwhelmed. Spectrum space in the shortwave bands is limited and had to be shared with

other users. At the same time, modern communications technologies, like high-speed computer data and video demand far more bandwidth than anything anticipated when the radio stations were built. Consequently, RCA was forced to turn away from shortwave radio to coaxial cable and satellites. The fact that RCA kept its radio facilities open until 1978

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suggests that perhaps on some level, they were a bit reluctant to *pull the plug*.

RCA consolidated Riverhead and Rocky Point in 1975, moving receivers from Riverhead to Rocky Point and closing down the Riverhead facility. Some of the interference problems feared in 1920 actually surfaced, but by that time the traffic had fallen off to the point where they could be tolerated. Operations at Rocky Point ended in 1978. RCA, which had been the single largest landowner and property taxpayer on Long Island, apparently decided that the costs of developing the sites were excessive, so it made a gift of them, valued at \$22 million, to New York State. The

the coast guard station at Chatham, Massachusetts. The last of the old long wave towers at Rocky Point was dynamited, and the buildings were left to the weather and vandals. The rest was unceremoniously scrapped, and much of what survives today are the bits and pieces that former employees saved from the dumpster. Following the reacquisition of RCA by General Electric in 1986, RCA Communications was purchased by and absorbed into MCI.

While the obsolescence of RCA's worldwide shortwave operations was inevitable, many former employees and radio historians feel that more should have been done to preserve the history of *Radio Central* and Riverhead.

Petitions were circulated, and legislators and news media were contacted in the hopes of keeping at least one of the buildings intact for a communications museum.

Today, apathy, and a lack of appreciation for the history that was made in these buildings has left them in an uneasy, decaying state of limbo.

State's Department of Environmental Conservation, which took custody of the properties, decided to preserve the land, but not the buildings, for watershed areas. The employees, many of whom had spent their entire careers at RCA, retired or found new jobs; a few were offered transfers elsewhere in the company. What could be sold or donated was removed, including some of the wooden antenna poles from Riverhead, which were bought and reused by Aeronautical Radio in Southampton, N. Y., for communications with airliners over the North Atlantic and Caribbean. Some of the modern sideband transmitters from Rocky Point were refurbished and reused at

When no public or private organization with sufficient funds to establish and maintain a museum could be located, the Department of Environmental Conservation tacitly acknowledged the history of the buildings and then declared them to be of little value architecturally. Badly damaged by vandalism, neglect, and uncaring clean-up efforts, they were described as a *liability and a nuisance that could not be tolerated*. Funds to demolish or find other uses then were sought, but have not been appropriated due to New York State's current financial situation.

Today, apathy, and a lack of appreciation for the history that was made in these buildings has left them in an

uneasy, decaying state of limbo.

The Beverage antennas are gone from Riverhead today, along with the rhombics and fishbones that came later and served RCA until the end of its shortwave days. With the antennas, Riverhead also lost much of its old rural farm town flavor; most of the farms are now shopping centers, office parks and housing developments, and Riverhead is a business district with its share—and then some of—suburban charms and difficulties.

Maybe a few motorists on the Riverhead-Quogue Road notice the small wooden sign that reads *David Sarnoff Park* at the barricaded entrance to a

narrow road that winds around to an old square, two-store, white stucco building that was once the Riverhead Receiving Station. There is rubble all around the building: its doors and windows, chunks of masonry, and metalwork from rack frames. Inside are bits and pieces of wrecked, rusting air conditioning machinery, empty racks and deserted workbenches, slate power panels stripped of their fittings, and bare consoles. Gaping holes in the roof light the dismal scene through dangling cables. The red tile floor crunches as if it was covered with gravel, a gravel of shattered tube sockets and terminal strips. ■

PARAGRAPH REVISION, PAGE 20, SPRING 1992 GAZETTE

When the rotor moved, the slots in its outer edge passed between rings of coils recessed in the inner faces of the stator. On the larger machines, the stator was assembled from individual wedge-shaped pole pieces constrained in a ring that just enclosed the outer edge of the rotor.

The cross-section of each individual pole piece looked like the letter "U" with the legs of the "U" turned inward. (The cross-section also looked like the letter "D" with a slot cut in the straight face of the "D").

The coils that provided the electrical output were imbedded in grooves cut in the legs of the "U" (Figure 7). The entire stator was magnetized by the current in an

annular coil located inside the curve of the "U" and going around the entire stator.

The coils experienced a change in magnetism as the slots in the rotor passed between the slots of the closed ends of the "U". The change in magnetic field induced a voltage in the coils which caused a current to flow in the external circuit. The frequency of the output was directly proportional to the rotational speed.

The amount of output was a function of the rotational speed and of the amplitude of the exciting current in the annular coil. By modulating the current, dots and dashes or tones could be generated by the Alexanderson alternator.

OLD EQUIPMENT CONTEST, *continued from Page 33*

CLASS V, Advertising

First Place, Stromberg Carlson Display, Ted Babcock
Second Place, Eveready Poster & Battery, Jack Parsons
Third Place, Big Broadcast Pinball Mach, Geoff Bourne

CLASS VI, Speakers

A. Original Models

First Place, Brown Type Q & H2, Larry Babcock
Second Place, Master Radio Horn, Merrill Bancroft
Third Place, Saal Horn, James Crews

B. Exotic Models

First Place, Ozarka Drum Speaker, John Deloria
Second Place, Timbretone, Ed Bell
Second Place, Brown Horn, John Glisson
Third Place, Qualitone, Ray Hill

CLASS VII, Pittsburgh Manufacturers

First Place, 4 Area Manufacturers, Jack Parsons
Second Place, 3 Area Manufacturers, John Haught
Third Place, Voco V-41-N, Bonnie Novak

CLASS VII, All American Fives

A. Wood Sets

First Place, Emerson A-4, Robert Lozier
Second Place, Jackson Bell, John Deloria

B. Bright Phenolics

First Place, Fada 263 V, John Deloria
Second Place, Zenith H615W, Mike Bowe

D. Novelty Sets

First Place, Piano Radios, Geoff Shearer
Second Place, General Tire Radio, Jim Rankin
Third Place, Modern Air, Gerald Schneider

CLASS IX, Consoles

First Place, Philco 15X, Geoff Shearer

CLASS X, Books On Early Radio

First Place, 5 Books on Radio, Geoff Bourne
Second Place, French WWI Radio Man., Ted Babcock
Third Place, 1899 Fahie Book, Ron McCellan

CLASS XI, Television Pre 1960

First Place, 1936 Mirror Drum Set, Herbert Waterman
Second Place, 3NP4 Protelgram, Geoff Bourne

CLASS XII, Transistor Radio

A. Pre 1960

First Place, Emerson 843, Robert Lozier

B. Post 1960

First Place, RCA 3KG4 Kit, John Deloria
Second Place, Little Lulu, Merrill Bancroft
Third Place, Airphone, Ray Hill

People's Choice Award, Jack Parsons, Eveready Advertising

Best of Show, John Deloria, Ozarka Speaker

President's Museum Award, Dr. Ralph Muchow, T-Y-K Radio Telephone From Japan

Houck Award, Tom Lewis for his book "Empire of the Air"

Book Review

RADIO & TELEVISION PIONEERS—

A PATENT BIBLIOGRAPHY

by David W. Kraeuter—1992, 329 Pages

Quoting from the author's Preface, "This book can be of use to anyone studying the technical history of radio and television, particularly as it developed in the United States." The book lists over 3,000 U. S. patents, by number, date and title, under the names of each of 40 inventors. The patents listed, ranged from those of Ernst Alexanderson (344 patents) to Vladimir Zworykin (114), reaching from the creative genius of Edwin Armstrong (57), to the relative obscurity of Joseph Murgas; deForest with 216; Fessenden, 229; Hazeltine, 26, A. Atwater Kent, 104; Marconi, 39; and McMurdo Silver, 1.

This is not a book to be read as one would read history or a novel. But, it is indeed an exceedingly useful resource to anyone who wants to get at the root of an early radio or television development and/or to know what the inventor himself thought or said about his invention. To do that, one will have to order a copy of the patent itself. Directions for doing that are given on page 309. Such a follow-up can prove disillusioning, as it once was to this reviewer when he first read deForest's Patent No. 879,532 on the triode. It clearly demonstrated that the self-styled *Father of Radio* did not know how his triode worked.

After describing the structure of his tube, the insertion of the grid element, and the resulting increase in

detector sensitivity, deForest stated that "Inasmuch as the explanation of this phenomenon is exceedingly complex and at best would be merely tentative, I do not deem it necessary herein to enter into a detailed

statement of what I believe to be a probable explanation." As an early manufacturer of vacuum tubes once remarked to this reviewer, "deForest's second-greatest contribution to the radio art was his sale of patent rights on the triode to AT&T, thus leaving to AT&T the triode's future development.

The book also reminded this reviewer that, as remarkably complete as it is, it cannot possibly list every significant patent in the field. Example, the basic patent on frequency modulation transmission and reception (Major Armstrong notwithstanding), No. 785,803, issued March 28, 1905 to Cornelius D. Ehret, a Philadelphia patent attorney. Claim 24 is a beautiful word description of Ehret's concept: "As an improvement in the art of electrical communication, the method which consists in producing electroradiant energy, and varying the frequency of said energy by and in accordance with speech."

One of the most rewarding departments in this reviewer's collection is his file of significant patents relating to early radio. The development of such a collection would have been greatly facilitated had Kraeuter's book been available in the 1950s.

To anyone wishing to add such a collection to his own museum, this book is essential—Available from the Museum of Radio & Technology, Inc. Price, \$35 plus \$2 S/H.

Reviewed by Bill Denk, W3IGU. ■



Ye Old SWAP SHOP

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WANTED: Need restorable junker chassis and speaker for Jackson Bell Model #62 Radio. **HELP:** I need miscellaneous parts (hardware, sails, mast, etc.) to complete the restoration of a Majestic Melody Cruiser Model #921 Radio. **WANTED:** AK tube socket assemblies (one and two tube type) for AK #10 breadboard restoration, and any other miscellaneous AK parts. **HELP:** I need restorable junk chassis for Emerson Model #547 and FADA Model #855, can anyone help. James A. DiRuzza, 2607 Old Troy Pike, Dayton, OH 45404, (513) 233-5004 eve.



WANTED: Any information regarding speaker reconing. Materials, procedure, etc. Steve Ruggles. 5 Wincrest Drive, Queensbury, NY 12804; (518) 793-0566.



WANTED: Correct knobs and speaker; plus speaker box/enclosure for Hallicrafters S-76. Charles T. Paterson, 34 Falun Road, Valhalla 0185, Pretoria, South Africa.



WANTED: Power supply for Atwater-Kent Model 36 (AC). I also need help and info about this set which is built into a Red-Lion desk-cabinet. Ted Carile, 501 Gatehouse Lane, Durham, NC 27707; (919) 493-7122.



WANTED: Circuit diagrams for Crosley 52 and RFL 75, Cleartone TDA-55, Ozarka S-1, Arborphone 27, Pfanstiehl 7, Thorola 51, Eagle Type B, Empire Sealed 5, Gilfillan GN-5, Globe 770, Thompson S-60, Valleytone 52, and Qualitone Type DR. Robert Stapleford, 1800 Randolph, Topeka, KS 66604.



FOR SALE: SAMS Photofacts for vintage radios and TVs. We also buy surplus SAMS Photofacts. Please contact A. G. Tannenbaum, P. O. Box 110, East Rockaway, N. Y. 11518; (516) 887-0057.



FOR SALE: Fifty or more radios and speakers with more on the way in here. Atwater Kents, RCA's, GE, Westinghouse, Philco's, etc. You name it—we may have what you're looking for. Perry King, 334 W. Garret St., Somerset, Penna. 15501; (814) 443-1256.



FOR SALE: Batteries, batteries and more of same, any size or shape, at prices you won't believe! Mostly new government surplus. Write for our lists if you really want a bargain. Nicads - Lithium, etc., some with binding posts, even No. 6 dry cells @ \$2 ea.; a case of six for \$10. S & G Electronics, 618 S. 62nd Street, Philadelphia, Pa. 19143; (215) 474-7663.



WANTED: DuMont television sets; any condition. I need the DuMont model RA 166/167 in good presentable condition. Also, any other items pertaining to DuMont TV sets (advertising signs, manuals, etc.) Christopher R. Angel, 1500 5th Avenue, Huntington, W. Va.

25701; (304) 525-6319.



WANTED: Citizens Radio Callbook Magazine 1920-1925. Dept. of Commerce Radio Stations of the U.S., 1913, 1914, 1915 & 1916. Dept. of Commerce Amateur Radio Stations of the U.S. 1920-1927. Dept. of Commerce Commercial and Government Radio Stations of the U.S., 1920-1928. Radio Amateur Callbook Magazine (Flying Horse Cover), 1926, 1935 & 1936. Consolidated Radio Callbook Magazine 1920-1924. Amateur Radio Callbook by Radio Director and Publishing Co. 1920-1925. Bob Arrowsmith W4JNN, P. O. Box 166, Annandale, VA 22003; (703) 560-7161, collect.



WANTED: Tapes, cassettes & records —old-time radio broadcasts, especially late 20s. Ed Jones, 43 Dundonald Rd., Colwyn Bay, United Kingdom LL29-7RE.



FOR SALE: McMurdo Silver Model 904 capacitance, resistance bridge, excell. cond., \$25; Simpson Tube Tester model 333, excell. cond. \$35; Radio Stars & Stations of 1934, a promotional booklet produced by RCA & Cunningham Radio Tubes, mint cond., \$5, Bill Hurni W3HWT, 329 Evergreen Dr., North Wales, PA 19454; (215) 699-5787.



WANTED: Zenith Trans-Oceanics, very good, brown leather case, working tube radios. Have B600L, T600L. Gregory Sheppard, 4402 Jupiter St., Rockville, MD 20853; (301) 946-6460.



FOR SALE: Many of your favorite old-time radio shows are available on tape cassettes. You select the shows you want and purchase them by the hour. Fast, friendly service. Send for our catalog listing nearly 5,000 shows arranged by category and title. Only \$2 (P & H). Send request to: Erstwhile Radio, P. O.

Box 2284, Peabody, MA 01960.



WANTED: Western Electric literature, components, receivers and a 14A amp. Also need 2-205-D, 2-239 or 264A or 262A and a 300A tube. Tad Drogoski, 507 Coal Valley Rd., Jefferson Boro, PA 15025-3703.



FOR SALE: Heathkit MP-10 Power Converter. 6 or 12 volt DC input, output 117 Vac, 175 watts continuous. With manual, \$30, ppd. Ken Greenberg, 4858 Lee, Skokie, IL 60077; (708) 679-8641.



WANTED: Power Transformer for Zenith Console Model 85661. X-Former Part # B95-756N. Tom Szerszen, 811 Bluff Ridge, Jacksonville, NC 28546; (919) 353-7028.



WANTED: Garod 5-6 tube. Neutrodyne receiver. It is a TRF with a fil and plate meter on the front panel. Tad Drogoski N3JZQ, 507 Coal Valley Rd., Jefferson Boro, PA 15025-3703.



WANTED: Zenith 6-volt farm radio, George M. Bonanno, 34 Charles St., Clifton, N. J. 07013; (201) 746-5953.



WANTED: Literature such as manuals, schematics and ads relative to an R. E. Lacault Ultradyne Model LR4 Superhet. Tad Drogoski N3JZQ, 507 Coal Valley Rd., Jefferson Boro, PA 15025-3703, 412-466-5950.



WANTED: Audio transformer for Crosley 51 series receivers open winding O.K., WeCo Model 14A amplifier - less tubes Klegg 88 Mobile 2 meter transceiver. Roll chart for Hickok 539 tube tester. Tad Drogoski N3JZQ, 507 Coal Valley Rd., Jefferson Boro, PA 15025-3703; (412) 466-5950.



FOR SALE: 25 sets of Sams below number 44 and Riders VII, VIII, IX, X, XI,

XII, XIII, XIV. I need a number 30 Sams. Also for sale - Electro-voice number 4300 communication radio with separate input amplifier; sell or trade any or all. SASE. (218) 564-4623; Walt Wra-bek, Rt. 4, Menahga, MN 56464.



FOR SALE: FADA Catalin Mod. 1000. No cracks, plays. \$450. Philco Mod. 20B. 95% original finish. Plays, \$250. J. Wetherholt, 6858 Merritts Cr. Rd., Huntington, WV 25702; (304) 736-3875.



FOR SALE: RCA Radiola 60, works, needs refinishing, original finish discolored, wood OK \$120; Silvertone Model E, uses 6 tubes (not incl.), 3 bad audio transformers, original finish can be saved. Inside needs good cleaning \$70. Also many other radios, books and collectible tubes. Send 2 stamps for complete photo-list, Ron Boucher, P. O. Box 541 (GA), Goffstown, NH 03045; (603) 497-2988.



WANTED: Meter for Hallicrafters SX 28 A. Same meter was used in Models SX 16, 17, 18, 24, 25, 27 & 32. Werner Dolder, 327 Heber Rd., Summerville, SC 29485; (803) 873-9465, call collect.



WANTED: Service manual for Fisher SA 1000 power amplifier. Any Fisher tube power amplifiers. **AVAILABLE:** Fisher Service Manuals and some rare parts dating from late 40s to early 70s. Al Pugliese, 27 Daleham St., Staten Island NY 10308; (718) 948-7489, evenings.



WANTED: "Junker" or "Basket" Case Riders, volume 1-6 (water damaged or worm eaten but serviceable). State condition and price; all replies answered. Itsuo Yano, 80 Lehua St., Kahului, HI 96732.



WANTED: Good transformer for a

Heath OM2 Oscilloscope also output amplifier for Heathkit stereo receiver AR 1500. Walton Dallas, 7428 Centenary Dr., Dallas, TX 75225-4515; (214) 363-1983.



MASTER'S ART RT-200 FOR SALE - Novelty Radio disguised as an antique wall telephone, works, excellent, crank missing (simple bent shaft, has no function) \$40. SILVERTONE MODEL E—battery set, uses 6 tubes, 3 bad audio transformers, original finish can be saved. Inside needs a good cleaning \$70; Also many other radios, books and collectable tubes. Send 2 stamps for complete photo-list to Ron Boucher, PO Box 541 (GA), Goffstown NH 03045, (603) 497-2988.

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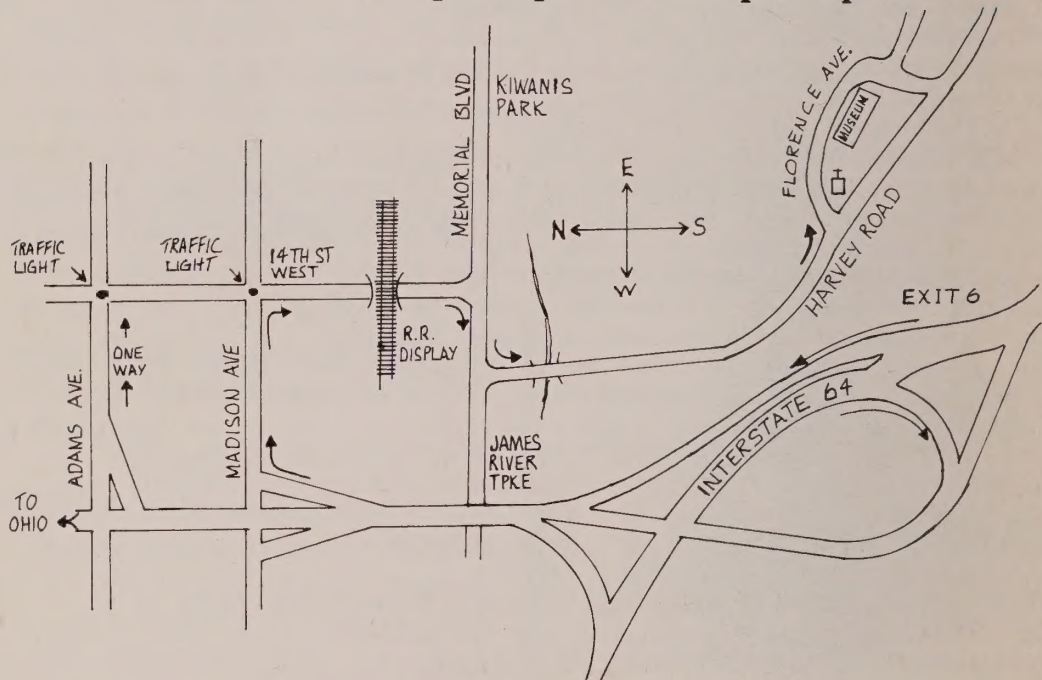


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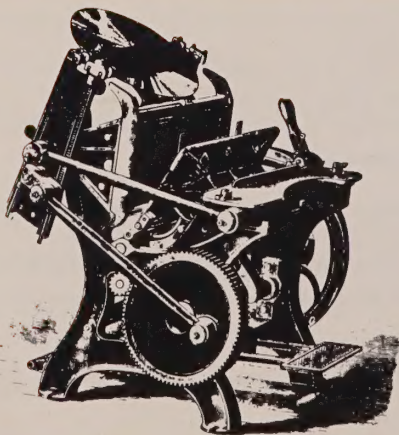
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